THE RUBBER AGE

ESTABLISHED 1917

COVERS ALL PHASES OF THE PRODUCTION AND MARKETING OF CRUDE RUBBER AND THE MANUFACTURE AND DISTRIBUTION OF RUBBER GOODS

Vol. 35 AUGUST, 1934 No. 5

INDEX TO CONTENTS

Electric Heat for the Curing of Rubber 225
By J. V. Calhoun and H. R. Houghton

Rubber Import Elimination Goal of Soviet 227

Vulcalock Process Improves Acid Handling 229
By J. R. Hoover

Rubber Division to Meet in Cleveland 231

The Use of Rubber Products in Hospitals 232

Rubber Suit for Flight Into Stratosphere 233

Modern Wholesale Tire Distributing Unit 233

Oxidation of Gutta-Percha, Balata, Rubber 233

New Rubber Available in Powdered Form 234

Readers Reply to Dr. St. Reiner's Article 235
Comments by J. B. Crockett and R. J. Noble

REGULAR DEPARTMENTS

Late Domestic News	239	**Editorials**	238
Financial News	242	**Chemical Markets**	249
Book Reviews	247	**Statistics**	250
New Goods	245	**Market Place**	254
Names in the News	244	**Advertising Index**	258
Rubber, Cotton Markets ...	248	**Classified Ads**	257

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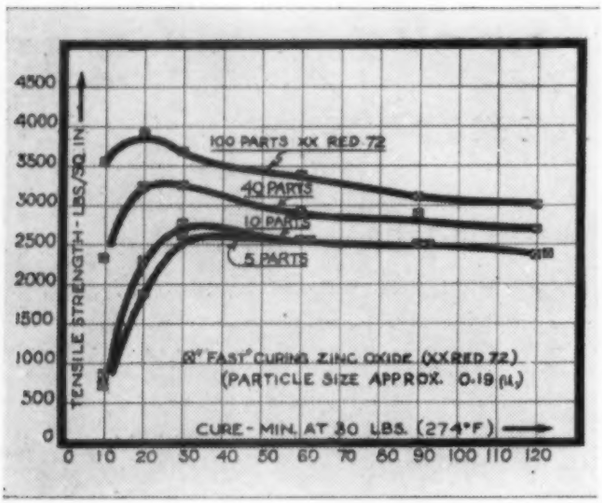
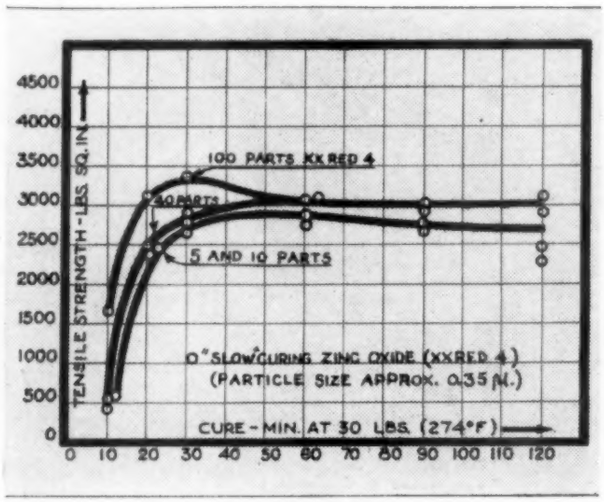
Concentration effects of "Fast" and "Slow" curing Zinc Oxides with "Captax"





SMOKED SHEET	50
PALE CREPE	50
"CAPTAX"	1
STEARIC ACID	1
PINE TAR	2
"NEOZONE D"	1
SULPHUR	3
ZINC OXIDE	Variable

Increasing amounts of "fast" curing zinc oxide (XX Red 72) show corresponding increases in curing rate. In the case of "slow" curing zinc oxide (XX Red 4) the curing rate is practically constant for additions of from 5 to 40 parts. • With 100 parts, however, there is an appreciable increase in curing rate.

NOTE: Ultimate tensiles on the "pure gum" stocks were obtained with the standard guage test piece. Higher test results would be obtained if a thinner test piece were used.

The New Jersey Zinc Company

New Jersey Zinc

160 Front St.
New York

No. 29 of a series of charts showing a comparison of "FAST" and "SLOW" curing zinc oxides with typical accelerators.

THE RUBBER AGE

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Electrical Heat For Curing Rubber

By J. V. Calhoun and H. R. Houghton *

MUCH has been written concerning the economies of electric heating and many attempts have been made to evaluate intangible savings that cannot be determined by modern cost finding methods. The quality of the finished article, better working conditions in the plant, and reduced hazards—the value of which cannot be accurately measured in dollars—prove the economy of electric heating.

These advantages have recently found their way into the manufacture of O'Sullivan's Rubber Heels. Greater uniformity in the curing of the rubber has added to the life of the finished heel, according to the statements of the manufacturers. This, in addition to marked saving in production costs, and improvement in working conditions in the press room.

Electric heat has been extensively used in heat treating of metals and other industrial applications that require close temperature control and uniform heating. It is, therefore, natural that vulcanizing, or curing of rubber molded products—a process requiring accurate and uniform heating—would turn to electricity for improved quality of product and reduced operating costs.

When a simpler and easier method of performing an operation is found, economies often take care of themselves. The growing use of electric heating for industrial and commercial purposes has proven that it is justified for many applications. Frequently the improving of a heating process makes a distinct saving in overall costs as the material has been increased in value, by processing before being heated. If material is not properly heated subsequent operations may be more expensive. The cost of electricity for heating purposes is often only a small percentage of the total electric power bill, as will be shown in this article.

In 1930 a Philadelphia manufacturer† of molded rubber products had brought to his attention the saving that could be made in production costs by the installation of electrically heated platens. Being faced anyway with the necessity of making a change in the boiler plant—the management was considerably interested. One 2-opening, 3-platen press was equipped with electrically heated platens and automatic temperature control. The result was, to put it briefly, a complete conversion of 5 presses to electric heat. Since that time, further increase in business has resulted in the installation of three additional presses—all electrically heated. The total connected load on the presses is now approximately 100 Kw.

An interesting thing about this installation is the fact that the electric heating load is the larger part of the connected electric load in this plant.

In the fall of 1932, The O'Sullivan Rubber Co., Inc., manufacturers of rubber heels, rubber soles, and similar rubber products also became interested in electrically heated platens, as it was necessary either to install a new boiler or use other means of heating at their plant at Winchester, Virginia. The advantage of electric heat looked attractive. The initial cost and installation of the electrically equipped platen was lower than that of a new boiler. The results obtained by the Philadelphia manufacturer and others using electric heat convinced the O'Sullivan management that, at least, a trial installation should be made in their own plant so that they could get first hand experience and knowledge as to just what electric heating could do for them. One 6-opening, 7-platen press was equipped with electric heaters and automatic temperature control.

Within one year after the first installation was made, all presses in this plant were equipped with electrically heated platens. The present total connected load for this one operation is over 500 Kw.

Careful records have been kept on the entire installation. These records cover current consumption and production.

* Electric Heating Engineers, Philadelphia, Pa.

† See article "Electricity for Curing," THE RUBBER AGE, Dec. 10, 1932, pp. 169-170.

BEFORE

Steam heated platens in operation at the O'Sullivan Rubber factory at Winchester, Va. The steam fumes are plainly visible.

Comparing the cost of kilowatt hours consumed by the platens only against former steam costs to heat these same platens it was found that a saving of $500.00 a month had been made. Other readily determined costs showed additional savings to approximately $800.00 per month. The overall cost of power per pound of rubber products produced was increased less than 6% by changing from steam heated to electrically heated platens. Although the electrically heated platens represented an increased connected load of 500 Kw. the increase in demand was only 200 Kw. The power factor of the complete plant load was materially improved by the operation of the electrically heated presses.

The working conditions in the press room of the O'Sullivan plant are also greatly improved—especially during the spring and summer months. Electric heat is dry and the air in the press room is now at a much lower relative humidity than formerly. Accident hazards have been decreased due to elimination of wet and slippery floors.

Greater flexibility of operation has also been obtained as each press is an independent, self-contained unit. Adjacent presses can readily be operated at different temperatures under automatic temperature control and the operation of one press has no effect on any other press. This is very important as different classes of work require different temperatures.

Temperatures are changed by a simple adjustment on the control instrument. An indicating dial shows the operator what the temperature is on the platens at all times. Results are readily duplicated once the proper time and temperature cycle has been determined. Former difficulties caused by erratic steam traps, sticky valves, variations in steam pressure and steam leaks are eliminated.

Maintenance costs are considerably lower than on a high pressure steam system. There are no swivel joints to keep tight, no steam line leaks and no steam traps to keep in operation. Corrosion and deterioration of equipment, floors, walks and piping due to the former humid, foggy atmosphere, is eliminated. Less floor space is required for the electrically heated presses than for steam heated presses and their auxiliary equipment such as the boiler plant, steam lines, etc.

A brief description of the application of electric heaters to platen presses will show the simplicity of the application. The presses referred to are hydraulically operated and equipped with heated plates or platens. The platens were of different sizes—namely, 40 in. long x 40 in. wide; 36 in. long x 36 in. wide; and 30 in. long x 30 in. wide. The thickness varied from 1½ in. to 3 in. Chromalox Heating Units of the refractory embedded type were used throughout in electrifying all platens. These Chromalox heaters, 1½ in. wide and, approximately, 5/16 in. thick were installed in the 40 in. x 40 in. platens by making each platen in two sections, then milling out slots in one section. The heaters are installed in the slotted half and the other half bolted to the slotted half to serve as a clamping plate.

All other platens were converted by taking the old platens originally used for steam, clamping the Chromalox Strip Heaters to them by means of steel plates.

In all instances, care was taken to insure good metal-to-metal contact between the heaters and the metal plates. This is very important to obtain uniform temperature and to provide the correct amount of heat. A brief summary of the general advantages of electrically heated platen presses follows:

1. Improved working conditions in press room.
2. Reduced accident hazards.
3. Greater flexibility in operation.
4. Results readily duplicated.
5. Lower maintenance costs.
6. Less floor space required.
7. Initial investment lower.
8. Operating costs comparable with other fuels and, in many instances, lower.

Such installations prove that electric heat can make savings in many industrial processes. Electric heat, once considered so expensive, is, when properly applied, the cheaper medium for many applications.

AFTER

One of the presses after being equipped with electric plates. Control instruments seen at upper left regulate temperatures.

Rubber Import Elimination Ultimate Goal of Soviet

USSR Plans Planting of 200,000 Hectares of Kok-Saguyz Plant; Development of Synthetic Rubber Primary Item in Its Program

C. V. Lebediev
Butadiene Process Discoverer

BECAUSE Russian imports of rubber increased from 14,707 tons in 1927 to 116,766 tons in 1930, and are expected to substantially increase in the future, plus the fact that higher prices of crude rubber are expected next year due to the restriction plan, the U.S.S.R. is planning to materially raise its current rubber output. At present 790 engineers and chemists are engaged in research in connection with rubber and synthetic rubber, in addition to twenty expeditions that have been scouring the country during the past few years for rubber-bearing plants.

The Soviet Union has cultivated the chondrilla plant in Kazakstan which contains between 12 and 28 per cent. of rubber. Quality is said to be excellent with the amount of tar being only 3 per cent. Wild chondrilla grows in regions experiencing extreme heat and cold and is being cultivated in Transcaucasia, Central Asia, Crimea, Ukraine, Northern Caucasus and near Moscow. It is estimated that by the end of 1937 an area of 1,500,000 acres will be planted with chondrilla to yield a total of 150,000 tons of rubber.

Guayule, a Mexican plant, has been introduced in Russia with expectations of 200,000 acres by 1937. Still another rubber-containing plant, known as eiconia, is being cultivated. Eiconia requires thirty years for full development. A means of rapidly multiplying this plant has been discovered and it is expected that the 10,000 eiconia plants cultivated in 1931 will increase to one million by 1937.

The Tau-Saguyz Plant
Left: A bush of the tau-saguyz plant with the root exposed to view. Right: Rubber filaments in a fragment of the root of the same plant.

Tau-Saguyz and Kok-Saguyz

But the plants upon which the Soviet government is depending most heavily to yield the greatest supplies of internal rubber are the "tau-saguyz" and the "kok-saguyz." During the Rubber Institute for Scientific Research's prolonged search for rubber-bearing plants Dierbekov discovered in 1929 that both of these plants contained rubber. They are herbaceous in nature and grow wild chiefly in Kazakstan. Experiment revealed that the tau-saguyz species had a content between 20 and 50% of rubber. Further experiments proved that the plants grow abundantly on irrigated land. Today tau-saguyz and kok-saguyz are cultivated in their native region of Kazakstan, in the Ukraine, Transcaucasia and also in the black soil area along the Volga. Plans call for the planting of 200,000 hectares of kok-saguyz by the end of 1937. This acreage is expected to yield 7,000 tons of rubber.

A special circular issued by the Rubber Division of the Department of Commerce during 1932 devoted to the tau-saguyz plant stated that the Soviet intended to spend about 600,000,000 rubles on this and additional plants to free itself from the necessity of importing rubber. The program for the second five-year plan, which ends in 1937, included the building of nine large factories with an annual capacity of from 7,000 to 15,000 tons for manufacturing tau-saguyz rubber.

Percentage of Rubber

According to the Russian view the roots of the tau-saguyz and the kok-saguyz contain coagulated rubber. The roots are dried and run through flour mills in order to separate the rubber, or they are soaked in water thus separating the fibers from the rubber. The Department of Commerce estimated that 10-month old tau-saguyz plants showed a rubber content between 8.6 to 13.9%, but the U.S.S.R. now reports a much higher percentage than those figures, as outlined above.

Early in 1932 the United States Department of Agriculture identified the tau-saguyz plant as a species of *Scorzonera*, of which over 100 have been recognized in Europe and Asia. It is not native to the United States but the "black salsify" variety is grown here in the same spe-

Cultivation

20 to 50% of rubber is extracted from the tau-saguyz plants cultivated on the plantation seen here. Later the rubber is transformed into sheets ready for use via the regular, standard methods. Sheets from this plant are also shown.

cies. The "black salsify" plant has a fleshy, edible root and is grown as a garden vegetable known as an "oyster plant."

Among products that have already been manufactured with rubber derived from the tau-saguyz and kok-saguyz plants are tires, tubing, gloves, footwear, balls and mechanical goods. Tires made from these plants were given extensive tests on automobiles during the famous Kara-Kum desert auto circuit run held last year. The tires are understood to have borne up well.

Still another plant that is being cultivated in the Soviet is one known as the "Vatochnik" plant. This is said to produce a smaller rubber content than the majority of the other cultivated plants, but is also being groomed for future use as rubber-bearing flora.

Synthetic Rubber in Russia

At present three synthetic rubber plants are operating in the U.S.S.R. Their combined output for 1934 is estimated at 12,000 tons, which is scheduled capacity. Before reaching their total capacity of 30,000 tons annually complete equipment is necessary. This is now being installed. Two additional synthetic rubber factories are under construction and may reach completion before the end of the current year.

Credit for the discovery of the process of producing rubber from alcohol is given to C. V. Lebediev who earned the Lenin-order for his work. In 1926 the Supreme Council of the National Economy launched a competition for the best method of obtaining synthetic rubber. Included among the terms of the competition were the statements that the synthetic product was "not to be inferior as to quality to natural rubber" nor was it to "differ considerably in price." Lebediev's process is said to produce an equal quality but falls far below the price standard set.

The synthetic rubber produced by the Lebediev process is termed "butadiene rubber." (Another source refers to the product secured from alcohol by this process as "duvenile"). The butadiene is made by passing ethyl alcohol under a slightly reduced pressure over a mixed dehydration-dehydrogenation catalyst, such as a mixture of alumina and zinc oxide. The yield is said to be 20% (34% of the theoretical). Butadiene is isolated from the reaction products by absorption in kerosene or turpentine, after first cooling to —5° C. in order to remove higher boiling material. The extraction of butadiene and the possibility of obtaining additional reaction products is claimed to make the process quite profitable.

Russian technologists have stated that the synthetic rubber produced from the process outlined has a wider temperature interval of elasticity than natural rubber. It suffers lower temperatures without hardening than the natural product and at temperatures up to 80-100° C. it does not soften, but becomes somewhat harder. Tires, tubes, footwear, mechanical goods, and still other products are now being produced from this synthetic substitute for rubber.

A museum in Leningrad has on display an entire case devoted to rubber products manufactured from the synthetic rubber. Cars equipped with synthetic tires were also run over the Kara-Kum circuit and are said to have proved satisfactory. Mileages up to 27,000 kilometers have been recorded. In the near future Soviet estimates call for the fabrication of 40,000 tons of synthetic rubber annually.

Search is still being carried on for the cheapest and most abundant raw materials such as potato or grain alcohol for the production of synthetic rubber. Another source of raw material is ethylene, now a waste product. If the coke oven gases were recovered up to 100,000 tons of ethylene would be obtained, and the same quantity from petroleum cracking plants. Estimated production of ethylene, if recovered from these sources, would amount to 450,000 metric tons out of which could be produced 80,000 tons of synthetic rubber, in addition to other compounds. This still would not satiate the internal demand but would materially lower present import totals.

Synthetic Rubber

At the far right is seen a block of Russian synthetic rubber 50 kg. in weight ready for shipment. The second photo reveals the polymerization department at the synthetic rubber factory in Yaroslvl, where the substitute product is cleaned.

Vulcalock Process Improves Technique in Acid Handling

Prevents Destructive Effects of Corrosion and Acid Leakage When Applied to Pickling Tanks

By J. R. Hoover

Assistant Manager, Chemical Sales Division, B. F. Goodrich Co.

HANDLING acid for pickling has traditionally presented one of the most troublesome, costly and baffling problems of steel plant equipment. Until very recently leakage and failure of acid tanks and sewers, rapid corrosion of overhead structures, disintegration of foundations and frequent shutdowns for repair have been taken for granted as an inherent burden of pickling room operation.

Modern trends in steel production, involving huge investments in continuous equipment and smaller margins of profit, have focussed attention on these items of cost as never before. Shutdowns for repair have more far-reaching and costly effects upon plant operation. With heavy continuous equipment the preservation of foundation structures against disintegration by acid becomes vitally important. Of necessity a new technique and a new point of view in acid handling are developing.

The steel engineer of today recognizes that acid leakage and the destructive effects of corrosion must be and can be prevented. A unique and versatile engineering material, rubber, is playing an increasingly important part. Several fundamental developments necessarily preceded the successful application of rubber linings to pickling tanks and auxiliary acid handling equipment.

The Vulcalock Process

Ten years ago research chemists in the laboratories of the B. F. Goodrich Company discovered a process, known

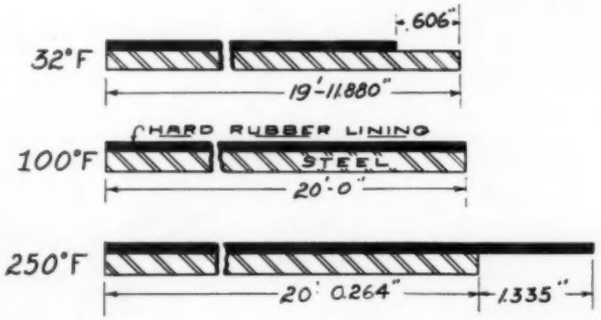


FIG. 1

as Vulcalock,[1] whereby rubber and steel can be bonded with adhesion exceeding 500 pounds per square inch. A new material of engineering was thus made available, combining the unique resilience and corrosion resistance of vulcanized rubber with the rigidity and structural strength of steel. A whole new field of usefulness for rubber and steel was opened up. Storage tanks, tank cars, pipe lines, valves and chemical process equipment, fabricated of steel and lined with rubber, presently became standard equipment in handling certain corrosives such as muriatic acid. Such materials as wood, glass, bitumens, masonry and stoneware were replaced with steel and rubber to great advantage in many industrial applications.

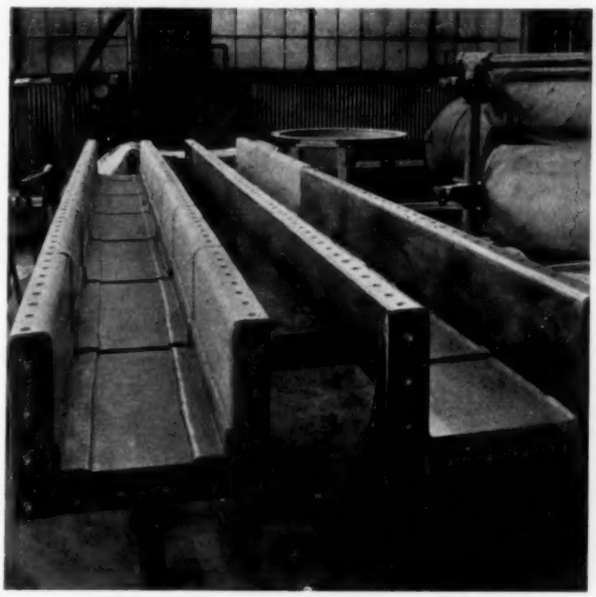


FIG. 2

Lining steel equipment by this process is accomplished, briefly, as follows:

(a) Preparation of the metal surface by sand or grit blasting.

(b) Application of the Vulcalock adhesive. This is an isomeric form of rubber, dissolved in solvent and applied like paint. Several coats are used.

(c) Application of unvulcanized rubber compound in sheet form. The rubber is sticky and semi-plastic at this stage, permitting adjacent sheets to be made integral at the seams.

(d) Vulcanization of the lining by steam or boiling water. It is during this heating process that the rubber and sulphur combine chemically, changing the compound to the desired form, soft or hard rubber. (Steam pressures of 20 to 60 lbs. per sq. in. are ordinarily used to vulcanize and secure proper ad-

This paper was presented by Mr. Hoover before the Association of Iron & Steel Electrical Engineers and appeared in the June issue of the Association's Iron & Steel Engineer.

[1] The Vulcalock Process. U. S. Patent Nos. 1,605,180-1,617,588.

hesion of rubber linings to steel. The recent development, however, of hard and soft rubber compounds which can be fully vulcanized at the temperature of boiling water makes possible the lining of large open tanks in the field. There is no size limitation.)

Rubber-lined steel tanks are not new in pickling; but most steel men four years ago had rejected them because of certain basic faults. Existing rubber linings were simply not adapted to the severe conditions encountered.

Hard rubber, best in point of chemical permanence, invariably cracked in service owing to the effects of impact or expansion and contraction with changes in temperature. The co-efficient of linear expansion of rubber within the temperature range 32°-250° F. is approximately five times that of steel. (Figure 1, in showing the relative expansion of rubber and steel, assume the lengths of rubber and steel are the same at 100° F. Also, note difference in lengths at other temperatures.) Even flexible or leathery hard rubber compounds, developed in an effort to overcome this limitation, gradually became weak and brittle when subjected to continued service at pickling temperatures. Cracked hard rubber linings, moreover, were extremely difficult to repair satisfactorily.

Soft rubber readily absorbed the strains incident to expansion and contraction, but was too easily cut and gouged by heavy metal parts. Soft rubber, too, lacked the resistance of hard rubber to oxidation and to the penetration of hot acid, oils and vapor.

A further defect in many of the rubber-lined tanks which had been tried in pickling was poor adhesion between lining and steel. Blisters formed and failure soon followed. Accidental puncture of a poorly adhered lining often permitted acid to creep between the lining and the steel, causing extensive damage to the tank before the original point of rupture was discovered. (Also a familiar defect in lead-lined tanks.)

Fortunately, the problem of integral adhesion had already been solved by the discovery of the Vulcalock process. In case of accidental puncture, the Vulcalock bond, in itself acidproof, allowed no seepage between rubber lining and steel tank.

With the successful application of this process as a background, our engineers turned to the job of designing a lining which would combine the merits of hard and soft rubber and eliminate the apparent weaknesses of each.

Triflex

The result was Triflex,[2] a distinctly new form of rubber lining, comprising a layer of true hard rubber (ebonite) cushioned between two layers of resilient soft rubber, all three plies being vulcanized together to form an integral structure. The resistance of hard rubber to chemical and solvent action, diffusion and absorption was combined with the resilience of soft rubber; at the same time yielding a structure of greatly improved resistance to impact, cutting and gouging. Repairs, if necessary, were easily made.

Adequate provision was made for expansion and contraction with changes in temperature. The plies of hard rubber in adjacent sheets of Triflex were overlapped in such a manner that they floated in soft rubber, free to come and go without distortion or cracking as heat conditions changed. (Figure 2.)

Bonded to steel by the Vulcalock process, the new three-ply lining with expansion joints was a fundamental advance in rubber lining. It is being successfully applied in the construction of acid fume ducts, tank covers, exhaust fans, acid sewers, storage tanks and electroplating tanks.

None of this equipment, however, undergoes the severe mechanical abuse to which pickling tanks are subjected. If the new lining was to be successfully used in steel pickling tanks it had to be protected in some manner from accidental violent contact with cradles, chains, or the steel being pickled.

(Continued on page 234)

[2] Triflex. U. S. Patent No. 1,919,366. Triflex linings can be applied by the Vulcalock process to large open tanks in the field and vulcanized in boiling water with adhesion to steel of not less than 500 pounds per square inch.

FIG. 4

FIG. 5

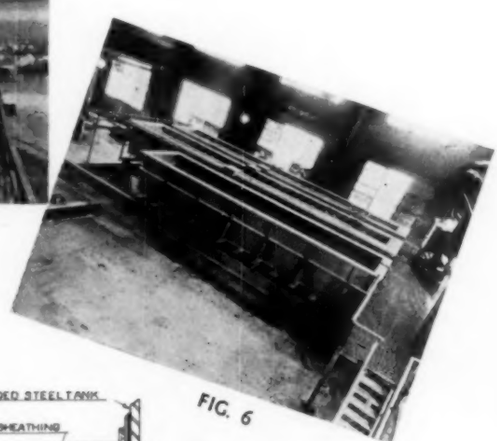


FIG. 6

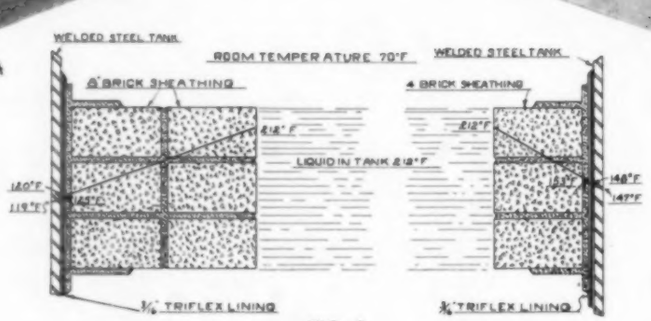


FIG. 3

Rubber Division Meeting

Fourteen Papers Will Be Presented During Week of September 10 at Sessions in Cleveland, Ohio

THE RUBBER DIVISION, A.C.S., will hold its annual meeting in Cleveland, Ohio, during the week of September 10, in connection with the 88th meeting of the Society. The Cleveland Hotel has been selected for the Rubber Division meetings, with the annual dinner scheduled for the evening of Wednesday, September 12. The technical sessions of the division will be held on Tuesday, Wednesday and Thursday, with the election of officers on Thursday morning. Abstracts of the fourteen papers to be presented follow:

ABSTRACTS OF PAPERS

Forms of Rubber as Indicated by Temperature-Volume Relationship. *Norman Bekkedahl.*

This paper describes measurements of the change of volume of rubber with change of temperature, which have been used as a means for determining the forms in which rubber may exist and ascertaining the conditions under which transition from one form to another may occur. This work is part of a study of the basic thermodynamic properties of rubber which is being conducted at the Cryogenic Laboratory of the National Bureau of Standards. In this study, an attempt was first made to measure the heat capacity of rubber over a wide range of temperature, but under some circumstances anomalies due to change in phase were encountered which took place so slowly that it was impracticable to follow them through by calorimetric methods. These anomalies have been studied by measurement of the changes in volume or coefficient of expansion associated with them, it being possible to follow changes in volume over as long a period of time as desired. At temperatures at which rubber is relatively stiff and rigid measurements of length have been used as an adjunct to the volume measurements.

The Heats of Combustion of Rubber and of Rubber-Sulfur Compounds. *R. S. Jessup and A. D. Cummings.*

Measurements with a bomb calorimeter have been made of the heats of combustion of samples of rubber purified by various methods, and of compounds of rubber and sulfur containing up to 32 per cent sulfur. In the calorimetric combustion experiments on rubber-sulfur compounds, an amount of aqueous Na_2CO_3 or NaOH more than sufficient to react with the products of combustion containing sulfur was placed in the bomb before each experiment in order to obtain a definite final state for the system.

The average value obtained for the heat of combustion of ether-soluble rubber in gaseous oxygen to form gaseous carbon dioxide and liquid water at a temperature of 30° C. and a constant pressure of one atmosphere is 45207 international joules per gram (weight in vacuo). The average values obtained for ether-insoluble and total rubber are lower by 0.9 per cent and 0.4 per cent, respectively, than the value for ether-soluble rubber. The samples of ether-insoluble and total rubber contained considerably more ash than those of ether-soluble rubber, and there is some evidence which indicates that the ash does not represent the total inert impurity in the samples. It is possible that if the inert impurity could be determined with greater accuracy the values for the heats of combustion of the different kinds of rubber would be very nearly the same.

The values obtained for the heats of combustion of compounds of rubber and sulfur in gaseous oxygen to form gaseous carbon dioxide, gaseous sulfur dioxide, and liquid water at a temperature of 30° C. and a constant pressure of one atmosphere may be represented by the empirical equation: $Qc = 45200 - 37{,}823\ m$, where Qc is the heat of combustion in international joules of one gram (weight in vacuo) of a rubber-sulfur compound containing m gram of sulfur. The average difference between observed values of heat of combustion and values calculated from this equation is 0.1 percent, and the maximum difference is 0.4 percent. From these data on the heats of combustion of rubber and of rubber-sulfur compounds, and the data of Eckman and Rossini on the heat of combustion of sulfur, the heat of combination of rubber with rhombic sulfur at a temperature of 30° C. and a constant pressure of one atmosphere, has been calculated to be 1881 international joules per gram of sulfur, or 60.3 international kilojoules per mole of sulfur, independent of the percentage of sulfur in the compound. The estimated uncertainty of these values is 15 per cent.

Studies in the Vulcanization of Rubber VI. Thermochemistry. *John T. Blake.*

(Abstract not available at time of going to press. Editor)

Thermal Properties of Rubber Compounds. II. The Effect of Pigmentation on the Heat Generation of Rubber Compounds. *C. E. Barnett and W. C. Mathews.*

In the present paper, good correlation has been shown to exist between pendulum tests on rubber compounded with various types of zinc oxide and flexing life as measured by the Firestone flexometer. The effect of particle size of zinc oxide on the results obtained in both tests has been investigated and the optimum particle size found to vary greatly with changes in pigment loading.

A New Laboratory Machine for Evaluating Breakdown Characteristics of Rubber Compounds. *R. S. Havenhill and W. B. MacBride.*

A new laboratory machine for testing rubber compounds is described. A specimen 1.5 inches in diameter and 1.5 inches long is placed between two parallel faces and loaded to produce either constant compression or with constant load, give variable compression in the specimen. The upper face is driven at 875 r.p.m. The lower face is rotated through the sample but is carried on a track wherein its axis can be thrown off the axis of the upper face, any desired amount, producing an angular flexing and distortion of the sample. The force required to maintain the axis differential between the two plates is definitely measured by means of a scale and those flexing forces produced in the rubber test specimen can be followed throughout the test. Stocks may be compared under conditions of so-called "constant load" with variable deflection or under so-called "constant deflection" with variable load. The end point, or first indication of failure is actually indicated by means of a scale. Results are given showing the effect on flexing forces due to change in volume loading and type of zinc oxide in the compound. Results are also given on commercial stocks showing excellent correlation with actual road tests on tire and carcass compounds.

The Surface Energy Relations Between Pigment Materials and Rubber. *Harlan A. Depew and M. K. Easley.*

Microscopical observations were made of the adhesion tension of rubber to pigment materials. The bond between carbon and rubber is relatively very strong in comparison with that of zinc oxide, while other pigment materials gave intermediate results. Overcured rubber lowers the adhesion, and particle shape is also a contributing factor. Separation occurs at particle sizes which are coarser than those found in commercial pigments, indicating that the breaking of rubber occurs within itself rather than at pigment-rubber interfaces.

Dispersion of Channel Gas Black in Rubber. *C. R. Park and V. N. Morris.*

It has been found that channel gas black disperses with difficulty in rubber in which the acetone-extractable matter has been reduced to 0.5 per cent or less. The addition of stearic acid to acetone-extracted rubber improved the gas black dispersion to a marked degree, thus demonstrating that stearic acid is a dispersing agent for black in rubber. The use of extracted rubber was made the basis for a method of testing the effect of various agents on the dispersion of gas black in rubber. In addition to stearic acid, several other materials were found to improve the dispersion. Still others had no effect, and a few (among others, paraffin) seemed to lead to slightly worse dispersion than that of the control. The dispersive power of a given agent for channel gas black in rubber was found to bear but little relation to the defloculating effect of this same agent on the black in a dipentane-gas black paste.

Natural and Synthetic Rubber. XV. Oxygen in Rubber. *Thomas Midgley, Jr., A. L. Henne, A. F. Shepard, and Mary W. Renoll.*

Sol rubber is not a hydrocarbon, but a compound with an approximate formula $(C_5H_8)_n$ OH, where n is larger than 500. Perhaps it is an alcohol. Three distinct types of oxygen link-

ages have been detected. A peroxide type of oxygen is present in degenerated rubber. Experimental details will cover combustion, methyl Grignard, determination, and thionyl Grignard determination.

Some Relations Between the Tear Resistance and the Structure of Rubber. *W. F. Busse.*

A qualitative theory of the tearing of an ideal highly elastic isotropic medium is discussed, and the results predicated from the theory are compared with tearing properties found in rubber. The discrepancies between the theory and the experiments have furnished some interesting details about the non-isotropic structures in stretched rubber.

On stretching high gum stocks, they develop a "semi-racked" structure which has a finite rigidity to shearing stresses. This structure which is largely responsible for the good tear of certain high gum stocks, is probably formed by the same crystals that produce the Joule heat and the x-ray fiber diffraction diagrams. The addition of pigments tends to destroy the semi-racked structure, thus decreasing the tear resistance.

A well cured stock containing sufficient gas black develops "mechanical fibers" on stretching. The high tear resistance and knotty tears found in gas black stocks are due to the weakness of the bonds between these mechanical fibers. Simple tests are described for studying the effect of temperature, state of cure, rate of stretching, etc., on the formation of thse structures.

A Method for Measuring the Pressure in a Rubber Extruding Machine. *J. H. Dillon and P. M. Torrance.*

A method for measuring the pressure exerted by rubber on the walls of the die of a tubing machine is described. An extrusion plastometer was used in these pressure measurements and the results obtained were employed in correlating the plastometer with a tube tubing machine. This was accomplished by determining the isothermal curve of efflux rate vs. pressure for the tubing machine and comparing with that for the extrusion plastometer. The measured values of the pressure at various speeds and temperatures of extrusion should be of value in the design of new types of extruding machines.

The Effect of Manganese Salts on Vulcanized Rubber. *George A. Sackett.*

The use of manganese salts in crude rubber manufacture gives a product which in gum stocks has lower tensile strength and poorer age resistance. This has been checked in captax, diphenyl guanidine, and rubber-sulfur mixtures. In a tread stock the effect on tensile strength and flex life is not so marked, but the abrasion resistance of the stock tested was seriously impaired. In the crude state, the rubber gradually becomes tacky and very weak. The use of manganese salts or permanganates in the manufacture of crude rubber should not be tolerated.

Value of Antioxidants in Counteracting the Detrimental Effects of Copper-Contaminated Rubber. *C. S. Towell and J. N. Street.*

The specific action of p-amidophenol in inhibiting the deterioration of soft vulcanized rubber contaminated with copper is shown. Thus the observations of Bierer and Davis are confirmed. The utilization of such rubber in soft rubber goods appears to be commercially feasible when p-amidophenol is used to counteract the effect of the copper.

Colloidal Changes During Vulcanization of Rubber. *Ira Williams.*

Rubber which has been lightly vulcanized with sulfur can be dissolved in benzene with the help of peptizing agents. The rubber may also be peptized by the action of accelerators in the absence of solvent. These materials are efficient peptizing agents only after rubber is attacked chemically. The action of soluble zinc compounds on peptized rubber sulfur causes a gelling action with great increase in tensile and modulus.

Higher Alcohols in Rubber Compounding. Part II. Glycerol. *W. B. Wiegand.*

The wide availability of glycerol, coupled with its trihydric structure, suggested its possible utility as a cure assistant, particularly in the presence of mercapto and pine tar. The effect of direct addition of glycerol to a tread mixing was quite marked even without reduction in pine tar, being in this respect superior to higher aliphatic alcohols. When used as partial replacement for pine tar, glycerol improved physical properties to an extent markedly greater than in the case of the aliphatic higher alcohols. The effect appeared to be enhanced when the glycerol was precooked with accelerator and/or the pine tar. The above conclusions are based entirely on laboratory tests and require factory confirmation.

Use of Rubber in Hospitals

SINCE hygiene, silence and durability are the three foremost requisites in hospital equipment, it is natural that rubber plays an important part in such equipment. Colonel J. Sealy Clarke, a prominent executive in the British hospital world, and a member of the Rubber Grower's Association, outlined the development of rubber in relation to hospitals, in an address at the opening day of an exhibition of the uses of rubber in hospitals held at the Hotel Metropole, London, last June.

The three requisites mentioned are found in many materials but it is doubtful whether all three are present in any other material than rubber. The hygienic properties of rubber, when used for flooring, are excellent, a recent investigation into the antiseptic properties conducted by the Rubber Grower's Association, proved, in finding that manufactured rubber resists bacterial infection to a remarkable degree. Microbes deposited on the surface of rubber, during these tests, entered but slightly into the deeper layers.

Tests conducted by the Mellon Institute have shown that from a standpoint of durability rubber flooring has a greater resistance to wear than even marble, the figures for loss due to wear being respectively rubber, 20.59%; marble, 23.18%; linoleum, 56.57%. Two recent developments in connection with rubber flooring for hospital use were discussed by Col. Clarke, one being a new plastic rubber flooring which is jointless and can be put down in certain places where previously sheet rubber or rubber tiling might have been considered unsuitable. The basis of this new flooring is latex used in conjunction with cement, with artistic effects being possible by the incorporation of rubber, stone or other chippings in the compound to form terrazzo or mosaic floors. The second development represents attempts to produce rubber flooring combining the properties of both rubber and linoleum in one product. It is believed this new material will soon make an appearance.

Referring to wall coverings the speaker mentioned a new form consisting of glass tiling embedded in a latex composition. Glass tiles may be backed with rubber, paper or fabric and when set in the wall the glass effectively prevents discoloration. Rubber wall bumpers, placed particularly at spots where walls form right angles, or on wall corners, are also being used in hospitals.

The use of rubber in hospital upholstery is increasing. Pneumatic mattresses are used for hospital beds, stretchers and ambulances. The development of sponge rubber, which does not harbor vermin, made from compounded latex and molded to desired shapes so that the resulting unit has very small pores, is finding favor in the manufacture of one-piece hospital seatings and mattresses. Rubber as a finishing material is also favored for hospital use because of its washability and dust-preventing possibilities.

The use of rubber for minor equipment in hospitals, some of which is now in effect, was urged by the hospital executive. Pointing out that any carrier on wheels should be rubber-tired, he also stressed the desirability of rubber used on buckets, water jugs, refuse bins, milk charms, and the like. These items fitted with rubber rims not only silences the noise peculiar to each, but also acts as a buffer preventing damage to hospital floor surfaces. In some hospitals these items are not only rubber-rimmed but the handles and ears of pails are rubber-covered. All-rubber lavatory seats are another method that can be used to lessen noise in the hospital.

Rubber Suit for Stratosphere

WILEY POST, noted airman, expects to reach a speed of 350 miles per hour in the rarified atmosphere of the stratosphere when he attempts a round-trip flight from New York to Los Angeles, as a preliminary test to competing in the MacRobertson International Air Race from London to Melbourne, Australia.

Pilot, with Rubber Suit, Ready for Stratosphere

In order to withstand the extremely thin pressure of air at such a height a specially constructed rubber suit has been built for the speed flier. The suit entirely encloses the wearer and feeds oxygen to his body through an extra super-charger which is installed in his airplane. It was made in the Los Angeles plant of the B. F. Goodrich Company, by John A. Diehl and W. R. Hucks.

Oxidation of Gutta Percha

OXIDATION of gutta percha, balata and rubber, respectively, with hydrogen peroxide yielded a number of non-crystallizing products which polymerize above 50 degrees, and cannot be distilled without decomposition, in tests conducted by Professor G. G. Henderson, the results of which were given at an address at Armstrong College, Newcastle-upon-Tyne, England, recently.

Calculating these products to a common unit C_{50}, the alcoholic product resulting from the addition of hydroxyl to double bonds were respectively $C_{50}H_{88}O_{24}$, $C_{50}H_{88}O_{20}$, and $C_{50}H_{92}O_{16}$. These formed acetates, with some dehydrations, which were respectively $C_{66}H_{92}O_{26}$, $C_{66}H_{96}O_{24}$ and $C_{58}H_{88}O_{14}$; further oxidation yielded another acetate in each case from which baryta formed an alcohol (saturated to bromine) in each case $C_{50}H_{56}O_{16}(OH)_{12}$, possibly identical from each. Reduction of the two former raw materials gave dihydrides with a great change in properties, whereas the hydrochlorides yielded on suitable treatment, not these same dihydrides, but unsaturated hydrocarbons of quite different type.

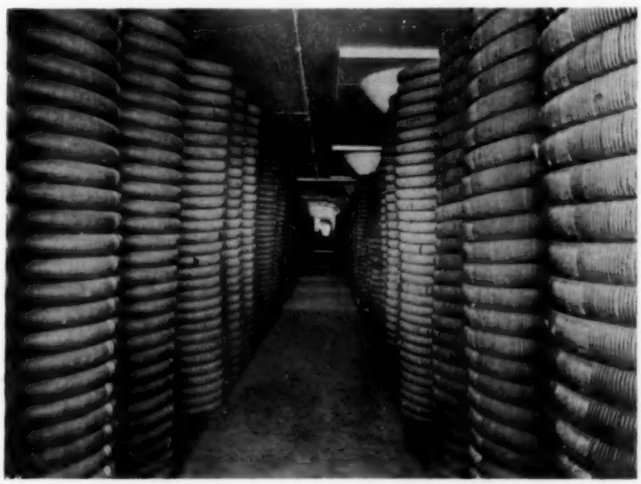
The dibromides of balata and gutta percha were found to condense readily with phenols in the presence of ferric chloride to give colored compounds, one of which may find application as an indicator. All three molecules may be regarded as condensation products of isoprene with roughly one-half of the unsaturation of the parent hydrocarbon. Further aggregation takes place by partial valencies, and this is broken down by the action of suitable solvents.

It would appear that rubber is more complex than the other two. The minimum complexity of all three is 10 units or a multiple of this, the molecular weights of the oxidation products suggesting the larger values. Some oxidation of methylene groups seems to take place in the later stages and the evolution of the carbon dioxide being relatively delayed in the case of rubber suggests a complexity of 40 isoprene units or more, in the molecules.

Modern Tire Distributing Unit

WHAT is literally a "tire plant in the sky" has recently been opened by the Westminster Tire Corporation in its new wholesale distributing establishment on the seventeenth floor of the Starrett-Lehigh Building in the lower west side of New York City. Storage space, shipping and receiving departments, display rooms and offices all are located on one floor, but with 100,000 square feet of floor space available there is no congestion.

Trucks are run into elevators at the basement level and raised to the seventeenth floor in less than a minute. A special loading pit, capable of accommodating five trucks at a time, faces the elevator at the Westminster stockroom entrance, and is so designed that the floor of a truck is level with the floor of the building.



Tiers of Tires Awaiting Shipment from "Plant in the Sky"

Piles of tires, each containing from 25 to 40 pneumatic casings, are arranged in rows extending the full length of the building. Some 175,000 tires and tubes are carried in stock.

Vulcalock Process in Acid Handling

(*Continued from page 230*)

Brick, because of its known chemical permanence, physical strength and low cost, was the logical material to choose for this part of the tank structure.

In addition to insuring freedom from mechanical damage to the rubber lining, brick sheathings were found to have the further merit of substantially reducing the temperature at the rubber surface. This was of fundamental importance. At high temperatures the useful life of any rubber lining will be shortened owing to the effects of more rapid diffusion and oxidation. The best ultimate economy is obtained by reducing the temperature at the rubber surface to 150° F. or less whenever possible.

The temperature reductions to be expected through single and double sheathings under conditions of normal room temperature and free circulation of air outside the tank are indicated by Figure 3. The insulating effect persists in spite of small cracks at the joints or seepage through the brick—and serves materially to increase the useful life of the rubber lining. Extremely large cracks which allow rapid convection currents of hot liquid to circulate in contact with the rubber lining are, of course, to be avoided in the interests of maximum service life. The thermal insulating value of brick sheathings depends upon a stationary column of liquid rather than a flowing column being maintained in contact with the lining. Reasonably free circulation of air around the outside of the tank is necessary in order to obtain the maximum reduction in temperature.

In deciding whether a single or double brick sheathing should be installed the nature and concentration of acids handled, operating temperature, room conditions and severity of physical abuse must all be taken into consideration.

Through the co-operation of engineers in the field of ceramics and jointing materials, a thorough, systematic study was made of materials and methods.

Acid-resisting shale brick of common size, wire cut and well vitrified, were found generally best suited for this work owing to their good adhesion to jointing materials, excellent physical properties, and low cost.

Bonding agents for the brick were chosen with respect to adhesion, strength of material (especially as regards impact), resistance to chemical action and steam, ease of application and cost. Although of somewhat higher cost than other types, sulphur-base jointing compounds when properly applied are usually the most economical over a period of years, owing to their superior durability in rough service. This applies especially to large tanks.

Sulphur-base compounds are melted and poured into the joints at a temperature of approximately 250° F. A very satisfactory method of construction has been developed and patented, involving the use of special rubber expansion joints in the brick walls and base, which relieve the complete structure from serious strains due to changes in temperature.

The essential features of an acid pickling tank appeared to be combined in this new steel-Triflex-brick design. During the past four years much valuable data and experience have been accumulated based upon actual installations. Tanks have been used, watched and constructively criticized. Details of construction have been developed. Engineers and operating men of the steel industry have cooperated in establishing the proper design of welded tank and in furnishing a proving ground of actual service.

Flange design and protection, structural reinforcement, methods of support, outlets and syphons—all were studied and improved.

Practical results speak for themselves. More than a hundred tanks of this new design have been installed during the past four years. All are in active service today. None have developed leaks or structural defects. In most plants they have earned their cost within the first year or two of operation. (For typical installation, see Figure 4.)

There has been a growing confidence among steel men that the wastes imposed by leaking tanks, corrosion and shutdowns for repair are *definitely avoidable*. This is the new point of view in acid handling. A new technique is developing, in which the rubber industry is proud to have a share.

Two of the largest continuous strip mills in the United States are equipped with the new acid tanks—a total of eleven 60-foot tanks in this service. In one of these mills the tank covers, fume exhaust system and acid sewers are all of rubber-lined steel construction. (Figure 5.)

Sizes of tanks in other plants range from small containers for pickling stampings and forgings to a tank fourteen feet wide, ninety feet long and eight feet deep for the continuous pickling of large sheets. Long heavy billets are being pickled, twenty tons per load, in two forty-five foot tanks installed during the summer of 1933. (Figure 6).

In every case maintenance work on the tanks has consisted simply in the periodic application of acid-resisting paint to the exterior. Heat from the bath within keeps the outside steel surface dry, minimizing corrosion.

Steel, rubber and brick, three widely different materials of construction, each designed to perform definite functions in the whole tank structure, combine to achieve these results. Pickling costs have been substantially reduced, working conditions improved, and a new market for steel opened up—objectives gained simply through the intelligent cooperation of far-sighted engineers and operating men who refused to be satisfied with wasteful methods.

New Rubber in Powder Form

A POWDERED rubber, made by a chemical process, has just been announced by the Heveatex Corp., Melrose, Mass. This form of rubber, a development of R. J. Noble, is said to contain a minimum of non-rubber water-insoluble protective agents, a fact which enables the rubber to exhibit physical properties which are not so adversely affected as to prevent its use in many processes. The rubber powder has a fine particle size and possesses extreme stability to mechanical treatment.

The powder may be made in pure rubber form or it may be compounded to any desired degree. A desirable feature claimed for the process is that the powder may be re-formed into latex by the addition of water, thus pointing to the possibilities of decreasing greatly the cost of transportation of latex. Another feature of importance is the fact that with the use of this rubber powder, breakdown time on the mill is reduced one-half compared to crepe rubber. Compounding ingredients may be added at the time the powder is made, mixing in the dry condition or at the time of milling.

Rubber in powder form offers a product with wide possibilities, not only in replacing sheet rubber, but also in simplifying certain manufacturing operations and the elimination of some heavy machinery. For molding purposes for instance, a hard rubber may be produced simply by placing suitably compounded rubber powder in a mold and curing under proper conditions. Another immediate possibility is its use as a raw material in the production of chlorinated rubber where a finely divided rubber powder offering a large surface is desirable. Rubber in powder form appears to be a new and versatile raw material which is expected to find many uses and applications not only in the rubber industry, but also in a number of other fields.

Comments from Readers on "Unsolved Problems of the Rubber Industry"

J. B. Crockett and R. J. Noble Reply to Dr. St. Reiner's Article Which Listed 15 Problems of the Industry as Yet Unsolved*

To the Editor of THE RUBBER AGE:

DR. ST. REINER'S paper seems to have fulfilled its object in provoking a considerable amount of discussion and from the comments so far published, it would seem that few commentors have either agreed or disagreed with his views completely. Apparently the disagreements with his views have been emphasized.

Impregnation With Latex—I am inclined to agree with Dr. St. Reiner's view of the state of the art as to penetrating fibrous materials with latex rubber. It is true that wetting agents have assisted greatly in improving this condition and that a few specialized processes have been developed which claim a complete impregnation but which are either very cumbersome and expensive to handle by the nature of the equipment required or have certainly not become generally adopted and available for use in the average rubber factory.

Therefore I think he is safe in saying that on the commercial applications of today the fibres are only coated and not impregnated through and through and it certainly is not a simple matter to obtain such an impregnation even with the use of wetting agents under ordinary plant conditions. The fact does remain, however, that considerable progress has been made in this direction in the last several years and the work that has been done has produced and is still producing interesting suggestions to attain thorough impregnation by simple and direct methods adaptable to plant use.

Vulcanized Latex—Schidrowitz's first experiments and publications are condensed in British Patent 193,451 (U. S. Patent 1,443,149). While this publication attracted considerable attention and is certainly of scientific interest, no commercial use whatever has been made of the process he describes in this patent either in Europe, Great Britain or the United States. In this reference he describes the vulcanization of latex particles while still in suspended form by placing a container of the liquid latex plus sulphur in an ordinary autoclave and vulcanizing, under pressure, at temperatures of the order of 286° F. and for periods of time of about 1 - 2 hours.

The discovery that the rubber particles of latex could be converted into vulcanized rubber by following a method ordinarily and commonly employed for vulcanizing dry rubber was certainly a matter of considerable interest but the difficulties of any such process, on a commercial scale, are obvious and, furthermore, as by this method fairly high percentages of combined sulphur were obtained, namely 2 to 3%, the recovered films were generally, as would be expected, non-cohesive.

It is true that experimentally cohesive films were obtained but in proportion to the increased combined sulphur: i.e. degree of vulcanization, the rubber when deposited showed the non-cohesive properties of vulcanized rubber. Obviously any higher form of vulcanization such as suggested by Dr. St. Reiner approaching hard rubber or even, for that matter, exceeding a combined sulphur of 3 or 4%, would only deposit a non-cohesive film of vulcanizite on drying, not to mention difficulties in preventing coagulation, etc., in carrying out such a process.

In view of the fact that it has not been practical to prevulcanize latex in liquid form with combined sulphurs of the order of 2 to 3% on a commercial scale, it would hardly seem feasible or practical to carry the step further and, in any event, the picture he suggests of spraying such a product on iron plate to deposit a hard rubber film is rather fanciful because even though it were practical to vulcanize latex in suspension to such a degree, upon the evaporation of the water a non-cohesive, hard rubber dust would be the end product obtained.

Schidrowitz followed his original patent and proposals with a patent of addition British Patent 208,235 (U. S. Patent 1,682,857) wherein he added sulphur, zinc oxide and an ultra accelerator, heating the latex only moderately and for a comparatively short length of time in open containers at atmospheric pressure. By this process he obtained a cohesive deposited rubber having the usual characteristics of ultra accelerated mixes—high physical properties and low chemical coefficient of vulcanization: i.e. combined sulphur of the order of .25 - .5%.

This product has not been widely used in Europe for the reason set out by Dr. St. Reiner, namely that the same end product: i.e. the same physical properties and combined sulphur may be readily obtained by adding sulphur, zinc oxide and ultra accelerators to latex in properly balanced proportions, evaporating the water and vulcanizing the deposited film either at low or high temperatures according to the usual practice in employing ultra accelerators with rubber. If the sulphur content is controlled and kept sufficiently low, vulcanization can be carried out readily to a definite end point,—to quote Dr. St. Reiner, "just as quickly as with already vulcanized latex."

During the prosecution of Schidrowitz U. S. application No. 1682857 he repeatedly disclaimed (1) the step of adding an ultra accelerator to latex (2) any form of vulcanization of the deposited dried or partly dried rubber, stating that he considered such steps to be old at that date (July, 1925) and generally well known. Furthermore during an interference action involving the same patent the law examiner of the patent office ruled that there was no invention in the step of adding an ultra accelerator to latex. It would seem certain, therefore, that latex users who are employing these steps are not following the teachings of Schidrowitz as stated by one of your commentors in the July issue.

Latex in Insulation—The use of latex in insulation was first suggested by Siemens in 1898 and, so far as is known, it has only been during the past few years that the disadvantages of this type of rubber: i.e. whole latex rubber, have been overcome by means of removing water soluble and hygroscopic solids content of the latex. The writer well recalls the poor insulating properties and rapid water absorption, in fact the impossibility of getting any kind of under water breakdown test at all on insulations of vulcanized latex film both prevulcanized and vulcanized in the

* *July issue,* THE RUBBER AGE, *pp.* 171-174.

ordinary way. This characteristic has, however, been quite satisfactorily overcome by treating the latex, for instance by repeatedly centrifuging it.

Preparation of Stocks—As Dr. St. Reiner is apparently not familiar with the progress on the production of pulverized or powdered rubber, he certainly had quite a lot of courage to suggest that rubber in this form might supersede milling. The problem, as a matter of fact, is not so much the production of rubber in powdered form as there are now no less than four proposals which are known to produce a powdered rubber: i.e. STAM, spraying with Dextrine—MARTIN, mechanical—DESCHEPPER, spraying and mechanical—NOBLE, chemical-mechanical. The product of some of these processes produces a powdered rubber which has a remarkably quick breakdown time, much less than standard sheet. The difficulties of using them as Dr. St. Reiner suggests, which are not fully overcome are (1) poor flowing properties in a mold of the tough unmilled rubber (2) method of simply admixing the powdered rubber with other powders and getting results approaching the intimate mixing obtained by milling (3) the necessity of changing over the type of rubber mold now employed in rubber factories.

However, employing the same equipment as used in the manufacture of synthetic resin products, it is possible to make rubber articles, suitable for some purposes, by merely mixing the powdered rubber with the powdered fillers and this process is particularly interesting in molding hard rubber articles. A rubber powder containing 100 rubber and 40 sulphur and in a very fine state of subdivision is readily molded in a plunger type of mold with or without fillers and eliminating all the usual steps of breaking down, mixing, etc. How rapidly such a process will be actually adopted by the rubber trade remains to be seen.

J. B. CROCKETT,
Heveatex Corporation, Melrose, Mass.

To the Editor of THE RUBBER AGE:

WHILE Dr. St. Reiner's paper is of value in directing attention to some of the problems of present day rubber technology, it would appear that not only are the problems badly chosen as to importance, but that in consideration of these problems, he was unmindful of some of the more recent developments. Some of the problems he discusses have attained some degree of solution, at least in industrial practice; others have a status in American technology that is apparently much different than is the condition in Europe.

Impregnation with latex.—The degree of impregnation obtainable with latex is greater than might be inferred from Dr. Reiner's statements. It is true that it is impossible to actually penetrate individual fibers with latex, due to the size of the particles. However, through the use of suitable wetting agents, such as Nekal B. X., Gardinol C. A., the Igepons, etc., together with proper operating technique, it is possible to saturate cotton cords and fabrics to the extent that each of the fibers are separately coated and the inter-fiber spaces are filled with rubber. Under these conditions of impregnation, a marked increase in tensile strength and flexing ability is to be noted.

Latex serum having a low rubber content (up to 20%) has been used for impregnation with considerable success. Serum obtained from the centrifugal concentration of latex is particularly suitable for this purpose due to the fact that it contains only the very smallest latex particles, the larger ones having been removed by centrifugal action. The serum particles which are much below the average size for normal latex, readily penetrate inter-fiber spaces but are, of course, too large to penetrate the lumen of cotton fiber.

It has been suggested that Du Prene latex is especially suitable for impregnation of fibrous materials, because of its small particle size. Until the price of this synthetic product is brought to a lower level, any extended use for this purpose seems highly improbable.

Vulcanized latex.—Although Dr. Reiner's statements regarding the industrial insignificance of this material are true as far as it applies to the Continent, it has found some application in the American rubber industry. It is doubtful, however, whether the use has increased as fast as that of latex generally. As Dr. Reiner points out, vulcanizable latex compounds containing ultra accelerators and which can contain any desired amount of sulfur, can be more readily prepared and at less cost than vulcanized latex. It may be added that such compounds containing ultra-accelerators, are quite outside the scope of the Schidrowitz process.

Use of Latex in Cables.—The use of Latex for insulation purposes generally has made considerable progress in this country, and for some purposes, processes are being operated on a commercial scale. Other than the electrodeposition methods, processes have been developed by the United States Rubber Co., Simplex Wire & Cable Co., and the Bell Telephone Laboratories. The last named company successfully employs a deproteinized latex in the manufacture of insulation.

Preparation of Rubber Stocks.—The suggestion that pulverized rubber be used in the preparation of rubber stocks is of real merit, although not new. Rubber powders have been made heretofore, but difficulties in their use have been encountered due to the large particle size, the large amount of water-soluble, non-rubber protective agents (such as glue, dextrine, etc.) employed, and tendency of the particles to cohere during storage. In at least one process, it is necessary that the rubber be highly compounded in order that it may be pulverized.

These undesirable characteristics of rubber powders have been overcome by a process recently developed in this country and now being operated by the Heveatex Corporation. By this process a nearly pure rubber powder, containing a very small amount of an insoluble protective agent, is obtained. Furthermore, the powder can be obtained in any degree of fineness up to about 100 mesh, and has no tendency to cohere during storage. By a modification of the process, the powder can be obtained in a form readily dispersible in water to form a concentrated latex, which may be diluted to any desired extent.

Powders made by this process can be subjected to any desired degree of compounding, either at the time of manufacture or by mixing of the powder and compounding materials, or in the usual manner on the mill. It also has the very interesting property of breaking down on the mill in about half the time required for fine crepe, thus effecting a material saving in power consumption, as well as minimizing the deleterious effects always associated with prolonged milling.

Vulcanization of Hard Rubber.—The long curing time for hard rubber referred to by St. Reiner is no longer common. Proper selection of accelerators enables the completion of the initial stages of the reaction within a few minutes, and complete reaction in less than half an hour. It has been reported recently (1) that by means of combined accelerators, one of which is a thiuram disulfide, the reaction can be completed in fifteen minutes or less, in slabs one inch thick.

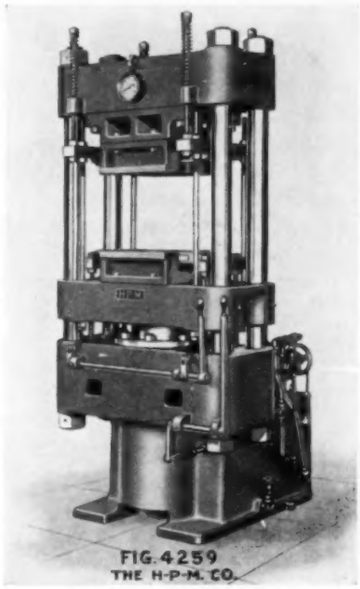
ROYCE J. NOBLE,
Chemical Engineer, Malden, Mass.

(1) IRW 88, No. 39.

New Equipment

Self-Contained Molding Presses

A NEW line of molding presses with individual electric motor drive has been developed by the Hydraulic Press Manufacturing Company, Mount Gilead, Ohio. Each press is self-contained with press cylinder and control valve equipment enclosed within a pedestal, which also contains the supply of operating oil.



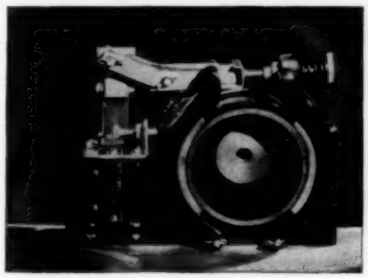
A complete system of controls provide adjustable automatic pressure control. They also regulate the speed of ram movements. The rate of pressure increase, on these new presses, is automatically governed according to predetermined adjustment. The press is arranged for rapid closing of the molds as a time-saver. The speed of both closing and opening ram movements, however, is controlled independently of the rate of press application. Six standard sizes ranging from 50 to 300 tons pressure capacity are available.

Safety Drum Stacker

A NEW barrel stacker or portable elevator for chemical plants, rubber manufacturers and all other industries handling barrels and drums has just been designed by the Lewis-Shepard Company, makers of handling equipment, at Watertown, Mass. The device can be equipped with strips on platform to prevent drums rolling off, equipped with turntable in platform to turn drums, equipped with removable rollers to handle cases, or equipped with platform rolls to rotate barrels so they will come "bung up" in rack. It has double "knee action" or hinges, both high and low, so that it may "bend down" when moving under beams and low ceilings or through doorways.

Cutler-Hammer Electric Brakes

A NEW line of small A.C. and D.C. solenoid operated brakes has been announced by Cutler-Hammer, Inc., Milwaukee, Wis. Three new brake sizes are included, with torque ratings ranging from 3 lbs. feet to 75 lbs. feet. These torque ratings are in accordance with NEMA standards, conforming closely to the full load torque ratings of small standard motors.

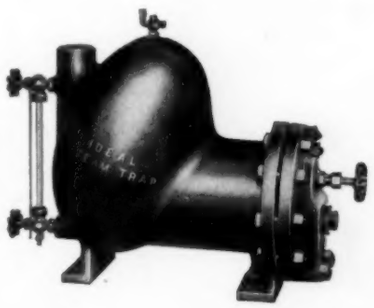


The brake wheel is relatively large, allowing low total brake shoe pressures, which, distributed over the large brake lining area, results in low unit pressure on the lining and, therefore, long, even wear of the friction surfaces. The low shoe pressure also results in low stresses on all pins and pivot points, assuring longer wear for these parts, and allows the use of a small operating solenoid which requires less current, thereby effecting a slight saving in operating costs of the brake.

Dimensions of the A.C. and D.C. brakes are interchangeable, so that machine designers can provide standard mounting holes and apply either the A.C. or D.C. brake as needed. Brake shoes use moulded brake lining and provide 180° braking service. These new brakes are intended for applications on machine tools, conveyors, small hoists, small elevators, printing presses, and similar small machines where quick, sure stops are required.

Trap for Steam Condensation

FOR the handling of condensation in manufactories using steam for heating, cooking, machinery operation, or generation of power, the Nason Ideal Steam Trap has been introduced by the Nason Manufacturing Company, 71 Fulton Street, New York City. A float principle



permits simple construction. It is made of heavy, seamless copper. Powerful leverage allows discharging of all condensation as fast as it enters the trap. It is not affected by pulsating pressures. Equipped with water gauge to assure proper handling of condensation.

Editorial Comment

Small Tire Dealers

ACCORDING to the testimony of several tire dealers, and the tone of the testimony of tire manufacturers, heard by Code Administrator E. D. Bransome during the public hearing held at Washington early this month, in connection with the attempt to secure higher "floor prices" under the existing rubber tire manufacturing industry code, the small tire dealer is becoming an increasingly lesser factor in the retail end of the business, and, in fact, may soon cease to be any portion of that factor whatsoever.

It is understood that many officials concerned with the administrating of the various rubber codes hold to this belief. Officials have constantly cited the consistently increasing number of factory-owned retail outlets to support this credo. Whether elimination of the small tire dealer is the panacea for the retail tire business we seriously doubt. The root of the evil is more to be found in "gyp" dealers, who sell tires at ridiculous prices to gain a 100% profit on the sale of the accompanying tube. The department store using tires as "leaders" for sales of automotive items other than tires and tubes, is another tribulation that will not be eased by elimination of Mr. Small Dealer.

True, the small dealer must often resort to "off-side plays" in an attempt to keep his business out of the sheriff's hands. But look at the handicap under which manufacturers permit him to operate! The minimum prices to consumers, according to statements made, are 77.5 per cent of the generally accepted consumer tire price lists in use by the industry, with only the smallest discount (25%) granted to small retailers. This discount, of course, is increased progressively to larger retail outlets. Thus, if selling prices come down to minimum, as they now are, a spread of only 2½% is allowed for the small dealer.

On this basis of profit, even were minimum prices to be raised by code authorities (as they may have been before you receive this issue) the small tire retailer is faced with the problem of operating his shop, paying labor, covering overhead—all on a profit percentage of 2½%.

It would be far more favorable for the small dealer were the National Recovery Administration to abolish price-fixing in the industry. Under competitive conditions in pre-NRA days he may have faltered in his stride but continued doing business his own way by his own methods, with what help he could secure from his distributor or manufacturer.

Faced with the problems above described, who can blame the small tire dealer for selling as heavy a volume as possible, at a price nearest the margin of profit, knowing that a rebate awaits him from his manufacturer at the end of the year for securing such volume? This has been described as one of the evils of the industry that should be abolished.

But perhaps its abolishment means the utter elimination of the small dealer. Perhaps it presages a future of all tire sales conducted by factory-owned retail outlets. We do not pretend to know. But we do know that unless the small tire dealer takes some drastic action, or has it taken for him, he is definitely on his way out of the picture.

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Labor Board for Rubber

WHETHER the formation of the Rubber Industry Labor Board, headed by Willard E. Hotchkiss as impartial chairman, is the answer to the internal labor problem of the rubber manufacturing industry is extremely doubtful. That it can be of tremendous value in the matter of strike prevention and temporary settlements between manufacturer and employe is, however, definitely assured. Until such time as the National Recovery Administration takes a definite stand on the now-famous Section 7-A, the hands of any industrial labor board are securely tied in attempts to really iron out besetting problems.

Fortunately the General Tire & Rubber Strike was settled just prior to Mr. Hotchkiss' appointment as chairman of the rubber labor board. But the issues involved in that strike, revolving around the Bedaux system, affect the entire rubber industry. As this is being written the Barr Rubber Products strike has just been settled, but workers at the American Hard Rubber Company have voted to strike. It is Mr. Hotchkiss' job, together with his to-be-selected associates (the board is to have a chairman together with an equal number of employer and employe representatives) to prevent, if possible, the threatened walkout at this plant, among others. Whether the board has sufficient power in its grasp to effectively avert such threats remains to be seen.

That the rubber unions are preparing to present collective demands upon the industry was forecast last month by Coleman C. Claherty, president of the United Rubberworks council, at Akron. Mr. Claherty wrote to Mr. A. L. Viles in the latter's capacity as president and general manager of the Rubber Manufacturers Association asking permission to present demands of rubber labor unions to the entire industry through the Association. Mr. Viles, who is also chairman of the Code Authority for the rubber manufacturing industry, advised Mr. Claherty that the Association did not represent the industry as a whole, and therefore could not conduct negotiations with the United Rubberworkers council.

It is self-evident that the labor leader will find other methods of presenting his demands on the industry. At such time the newly-created rubber labor board will find itself in the midst of the turmoil since legal heads advise that the "board can handle an industry-wide dispute as well as one affecting any one or two or any group of factories."

That the rubber labor board will be called upon very soon to show its teeth is positive. Time alone can tell the result.

CURRENT • NEWS
of the Rubber Industry

AUGUST, 1934

Hearings Conducted on Tire Price Revisions; Hotchkiss Named Head of Rubber Labor Board

Dealers Are Opposed to Price Fixing—Manufacturers Urge Higher Tire "Floor Prices"—Rubber Labor Board Swings Into Action—Budgets Being Set

TWO important items were of paramount interest to the rubber manufacturing industry during the past month relative to National Recovery Administration activities. These were the appointment of a rubber labor board and the battle on the fixed "floor prices" prevailing in the tire industry. The labor board was appointed by request of the industry itself, while a hearing was called at Washington on tire prices at the insistence of both manufacturers and dealers.

As we went to press with this issue of THE RUBBER AGE hearings were being conducted before E. D. Bransome, recently appointed deputy administrator of the rubber code authority, and Leon Henderson, NRA planning division chief, in an effort to disentangle the complaints of various factions in the tire manufacturing industry.

Members of the retail tire and battery code authority, backed by such tire manufacturers as Seiberling and Fisk, asked the NRA, at the public hearing which started on August 3, to increase minimum prices on tires and tubes from 7.1 to 10 per cent. Present levels were established on May 3 and are said to have led to the disastrous price war now existent in the industry. In addition to the request for higher prices this faction of the industry asked that the old differential plan be grafted onto the "floor price" provision.

This plan calls for three sets of "floor prices," one for the six leading tire makers (which include Goodyear, Goodrich, Firestone, United States, Kelly-Springfield and General); a second for the smaller manufacturers; and a third for private-branded tires sold by oil stations and mail-order houses. A stagger system of prices would apply in this plan.

Tire Manufacturers Heard

Both F. A. Seiberling, president, Seiberling Rubber Company, Akron, and E. D. Levy, president, Fisk Rubber Corp., Chicopee Falls, Mass. raised their voices in protest against present minimum prices at the public hearing. The former predicted the elimination of 180,000 retail tire outlets by next year unless prices were raised, and challenged any tire manufacturer to aver that he is "making a single dollar profit" under existing prices. He accused mass distributors of starting the price war and also the guarantee problem which, in some cases, has now reached a twenty-four month guarantee.

Mr. Levy, in urging a price differential of 10%, stated that anything less would be "almost insulting to the intelligence of anyone who knows the tire business." James M. Butler, of the Pharis Tire & Rubber Company, Newark, Ohio, added his voice to that of the Fisk executive's objection to the price plan asserting that it was a "miserable farce" for the large tire manufacturers to ask the NRA to hold their prices to their level.

Several small tire dealers testified as to their inability to make a profit at existing price levels. The minimum prices to consumers are 77.5% of the generally accepted tire price lists used in the industry. The smallest discount (25%) is granted to small dealers, which increases with the amount of tire orders. Thus, a spread of only 2½% is allowed for small dealers in the event that selling prices are maintained at a minimum.

On July 11 Hugh S. Johnson, NRA chief, approved the application of the rubber manufacturing and tire industry for the establishment of a rubber industry labor board, despite the objections of the National Labor Relations Board which complained of the formation of the board which calls for a permanent, impartial chairman and an equal number of employer and employee representatives, the latter to be appointed and serve as members only in specific cases.

On July 13 Administrator Johnson announced the appointment of Willard E. Hotchkiss, of Chicago, to the chairmanship of the rubber labor board. Mr. Hotchkiss is president of the Armour Institute, Chicago, and is a member of the research and planning division of the NRA. His term is of indefinite duration. Sixty years of age the new labor administrator for the rubber manufacturing industry has an interesting background including experience in textile, coal, building, meat packing and shipbuilding industries.

Code Sidelights

The three rubber footwear manufacturers accused of violating the price provisions of the rubber code, i.e., the Phillips-Baker Rubber Company, the La-Crosse Rubber Mills Company and the Goodyear Rubber Company, filed an answer on August 3 to those charges. All three concerns charged the NRA with oppressing small industry and maintaining a monopoly. They claimed that the rubber code was issued without their consent or knowledge and that its price provisions endangered their businesses. All three were charged with failing to post their price lists as demanded by the code.

The budget of the Rainwear Division of the rubber manufacturing industry was approved by the NRA on July 18. It provides for an expenditure of $37,650 for the nine months period beginning April 1, 1934. The basis of contribution to the budget is a charge of $10 per thousand for labels to be attached to garments manufactured by the industry.

Application for approval of the retail rubber tire and battery trade budget was made on July 13 amounting to $298,050. The basis of trade contribution is on gross consumer sales per outlet. Any criticisms of this proposed budget were to have been heard in Washington prior to July 25 before Deputy Administrator E. D. Bransome.

The NRA approved a schedule of uniform terms of sale asked by the mechanical rubber goods division of the code on July 12. The schedule represents the maximum terms of sale by members of that industry.

Unfair Trial

The story is told of an English mechanical engineering consultant to whom rubber was literally anathema. He condemned it and its possible use without rhyme or reason. Eventually it transpired that he had experimented with hot-water joints cut from twopenny erasers!—*from The Financial News.*

TIRE DEALERS TESTIFY IN GOODYEAR DEFENSE

The Goodyear Tire and Rubber Company is introducing thousands of photostatic copies of advertisements as evidence in their defense of anti-trust charges brought by the Federal Trade Commission against the company with relation to its contract with Sears, Roebuck & Company. The way was opened for the introduction of such evidence through a ruling of the Federal Commission over-ruling that of Examiner John W. Bennett who had barred such copies as evidence. Between 10,000 and 30,000 advertising exhibits are planned by Goodyear attorneys.

Examiner Bennett also ruled out cost and price tables prepared by the defense on July 27, the same date on which the hearing was removed from Akron to Cleveland. This decision has been appealed to the Commission at Washington but the case continues without a definite ruling on this subject. Bennett held the figures to be irrelevant.

Retail tire dealers from various parts of the East testified at the Cleveland hearings that they were often able to undersell the Sears concern by as much as 15 per cent. Richard McDonough, operating five stores in Newark, N. J. testified on August 2 that department stores which make a "leader" of their tire sales hurt his business far more than chain organizations such as Sears, Roebuck & Company, who maintain prices for the tires they sell.

A tire dealer of Jamaica, L. I., New York, revealed that dealers generally sell tires without profit with the idea of making 100 per cent profit on the accompanying tube. He also stated that "gyp" dealers can sell tires at 25 per cent below advertised prices because they receive bonuses from manufacturers at the end of the year based on the large volume thus attained.

Dealers from Jersey City, Brooklyn, N. Y., Pittsburgh, Mass., and other sections also testified that Goodyear had not violated the anti-trust laws as alleged by the Federal Trade Commission. The trial is expected to continue for many months, and probably years, what with decisions, appeals, and the like.

Higgins Returns from Trip

W. W. Higgins, Eastern District Sales Manager, United Carbon Company, New York City, has returned from a two month tour of England and Scotland. During his sojourn abroad Mr. Higgins called upon his firm's agents representing the carbon concern overseas and also spent considerable time with engineers and technologists of the larger rubber manufacturers in the British Isles.

Discusses Decreased Sulphur

The July-August issue of *The Vanderbilt News*, house organ published by R. T. Vanderbilt Company, New York City, is devoted in entirety to the "Effect of Decreasing Sulfur on Tensile Properties at 100° C." The results of a number of tests are shown in both graph and chart form and are said to have proved that resistance to heat and aging increases as sulfur is reduced, with the greatest resistance obtained below 0.75 per cent sulfur.

Rubber Scores!

Rubber is used for three different functions in the Mersey Tunnel recently opened in London. 2,000 square yards of rubber paving blocks have been laid for the full width of the carriage way; vari-colored rubber blocks have been used for seven miles of traffic lines; and rubber has been used for curb blocks at certain sections along the tunnel. All rubber blocks were furnished by Universal Rubber Paviors, Ltd., of Audenshaw, England. The paving blocks are only 1¾ inches in depth and consist of rubber based on cast iron.

PRODUCTION OF TIRES 14.1% BELOW MAY, 1933

Shipments of pneumatic casings for the month of May amounted to 5,331,699 casings, an increase of 20.1% over April and 2.9% above May (1933), according to statistics released by the Rubber Manufacturers Association, Inc.

Production of pneumatic casings for May was 4,456,223 casings, a decrease of 6.6% under April and 14.1% below May 1933.

Pneumatic casings in the hands of manufacturers May 31st amounted to 11,126,567 units, a decrease of 7.1% below April 30, 1934, but were 64.6% above stocks May 31, 1933.

The actual figures are as follows:

PNEUMATIC CASINGS

	Shipments	*Production*	*Inventory*
May, 1934	5,331,699	4,456,223	11,126,567
April, 1934	4,438,378	4,769,980	11,980,731
May, 1933	5,180,173	5,189,291	6,760,165

Holfast Asks Wage Exemption

Holfast Rubber Company, Atlanta, Georgia, has made application to the National Recovery Administration, at Washington, asking for exemption from the minimum wage provisions of the approved code for the rubber manufacturing industry, it was announced on July 31. Public hearing on the Holfast request was to have been conducted on August 16 in the Department of Commerce Building, Washington, D. C.

The McClaren Rubber Company, Charlotte, North Carolina, also has applied for exemption from the wage provisions of the code. Public hearing is to be conducted on this request on August 20. The wage provision calls for the payment of forty cents per hour with an absolute minimum of thirty-five cents per hour in specific cases.

Germany Bans Tire Sales

According to a report from the Reuter News Agency dated July 18, Germany banned sales of automobiles and tires in dealers' stocks on that date until August 1. The official order required all manufacturers, wholesalers and dealers to take immediate inventory and report to the government on existing stock. Sales on tires were to be regulated after August 1 on the basis of these inventory reports. It is believed that the move is intended to conserve rubber on hand in Germany as much as possible.

SMALLER PLANTATIONS RESUMING ACTIVITIES

With slowly rising prices on rubber expected to go much higher in the early future, small plantations are resuming activities and the gathering of wild rubber is being stimulated. This is a result of the recently-instituted restriction scheme. Shipments of wild rubber have been insignificant as compared with imports of plantation rubber, but a Department of Commerce release dated July 31 predicts increased wild rubber imports within the next several months.

In recording imports during the first five months of 1934 the release points out that Guayule rubber receipts are especially notable since they represent the first imports since October, 1930.

Imports for this period reported by the Leather-Rubber-Shoe division of the Department of Commerce follow: From the Gold Coast, 61,835 pounds; from French Equatorial Africa, 24,478 pounds; Mozambique, 58,740; Philippine Islands, 289,399; and Guayule rubber from Mexico 560,000 pounds.

Testing Ground for Rubber

Included as part of the U. S. Rubber Company's exhibit at the Century of Progress, which tells the story of rubber from plantation to finished product, is a testing ground proving that Tempered Rubber, the tread used in U. S. Royal tires, is as tough as steel and tougher than concrete. It consists of a circular roadbed comprised alternately of rubber, concrete and steel blocks over which an emery wheel rolls, making one rotation every eight seconds.

During the first 37 days of the Fair the wheel had revolved a distance of 531 miles, rated four times as great as ordinary road wear, the amount of wear being negligible in both rubber and steel blocks, each material showing only a groove the greatest depth of which was 3/100 of an inch, while the concrete showed a groove of 2⅜ inches.

Lancaster Equipment Sold

All of the machinery of the Lancaster Rubber Company, Lancaster, Ohio, which was purchased by the Bear Foot Sole Company on May 1, has been moved to the Akron factory of the latter concern. The Lancaster firm formerly manufactured rubber soles and heels and employed between eighty and one hundred people.

Mansfield Resumes Operations

Mansfield Tire & Rubber Company, Mansfield, Ohio, has resumed operations after a short shut-down during which machinery was replaced and repaired, while employes were given vacations. P. H. Ober is vice-president and general manager.

Barr Strike Finally Settled

Approximately 100 employees of the Barr Rubber Products Company, Sandusky, Ohio, returned to work on July 25 after a strike that lasted since April 9. The employees returned under terms outlined by the National Labor Board which they previously had rejected.

CENSUS BUREAU REPORTS RUBBER FOOTWEAR LOSS

According to a preliminary tabulation of data collected in the Biennial Census of Manufactures taken in 1934, released by the Bureau of Census from Washington, manufacturers engaged primarily in the production of rubber footwear produced an output valued at $39,128,790 (at f.o.b. factory prices) during 1933. Compared with the value produced during 1931, the preceding census year, this amount represents a decrease of 13.6 per cent. The average number of wage earners for the year, however, increased 14 per cent. and total wages increased 4.9 per cent.

The principal items which entered into the total for 1933 are as follows: Rubber boots, 2,572,892 pairs, valued at $4,589,594; rubber shoes and overshoes 31,277,685 pairs, valued at $22,120,515; canvas rubber-soled shoes, 26,328,937 pairs, valued at $12,-418,681. Comparing the 1933 figures with those for 1931, some classes of footwear show increases in number of pairs, together with decreases in value, and others show larger decreases in value than in number.

In addition, rubber boots and shoes are made to some extent as secondary products by establishments engaged primarily in other lines of manufacture. The production of these commodities thus made outside the industry proper in 1931 was valued at $3,022,850, equivalent to 6.7 per cent. of the value of the production within the industry. The corresponding figure for 1933 is not thus far available but will be given in the final report of the present census.

CHANGE TRADE NAME TO MICRONEX BEADS

Binney & Smith Company, New York City, announced a change in name of Dustless Micronex to Micronex Beads. The latter is a standard rubber black free from grit, controlled for rate of cure, plasticity in uncured stock and made with special regard to dispersion. It offers all the old advantages of Micronex in combination with the spherical form designed for use in connection with bulk handling and for factory layouts where dusting constitutes a serious problem.

The standard Micronex Beads, according to the Binney & Smith announcement, is a fast curing black capable of meeting the specifications of rubber companies which require fast black and at the same time offers the advantages of the soft grade of channel black produced for high tread loadings, and for mechanical goods where smooth extrusion is essential. The pelleting process employed is carefully regulated to avoid production of a hard pellet which will not disperse so thoroughly as ordinary heavy compressed black. Micronex Beads is protected by basic product patents.

COLLECTIVE BARGAINING DENIED BY ASSOCIATION

The Rubber Manufacturers Association officially informed the United Rubber Workers council, of the Rubber Union, early last month, that it lacks the power to enter into collective bargaining negotiations for the entire industry. This statement was contained in a letter forwarded by A. L. Viles, general manager of the Association, in answer to written demands for collective bargaining presented by Coleman C. Claherty, president of the Rubber Council.

Subsequent to the receipt of the RMA's letter Mr. Claherty stated that he would lay the whole matter before Lloyd Garrison, chairman of the new National Labor Relations Board at Washington, in an effort to enforce the collective bargaining provisions contained in the NRA.

Bata Building Chemical Plant

The erection of a chemical plant to manufacture sodium sulphite and bisulphite, has been started by the Bata Company, leading Czechoslovakian producer of shoes, in that country. The concern recently commenced the production of precipitated chalk for use in rubber manufacture.

Fisk Rubber Curtails Output

A curtailment program which will reduce daily output of tires from 6,000 to 3,000 has been put into operation by the Fisk Rubber Corporation, Chicopee Falls, Mass. Curtailment of truck tires is to be heavier than that of passenger car tires, it is understood.

Predict Tire Sales Drop

Standard Statistics, Inc., New York City, predicted a definite drop in automobile tire sales for the balance of 1934, in a release issued recently. Tires were listed among the businesses expected to make the "poorest showing" during the second half of the year.

Master Tire Moves Offices

Offices of the Cooper Corporation, subsidiary of the Master Tire & Rubber Company, have been moved from the Findlay, Ohio, factories to Akron, where they were consolidated with those of the parent organization. About 300 workers are employed in the Findlay plants of the company. The move was announced as an economy measure with 60 office workers being dropped from the Findlay payroll.

Drop Publication of Crops

Because of the introduction of the restriction scheme the Rubber Growers' Association, of London, England, has announced that it is discontinuing the collection and publication of crop returns, a summary of which was formerly released monthly by the Association.

GENERAL TIRE'S STRIKE IS SETTLED AMICABLY

Applicants at the General Tire Employment Gates After Strike Settlement

The strike at the General Tire & Rubber Company's plants at Akron, which was called on June 20, was amicably settled on July 18 with both factions involved in perfect accord.

By a unanimous vote, workers at a mass meeting voted to accept a proposal submitted to them by the company and approved by a negotiating committee of the employees.

The proposal included mutually satisfactory provisions regarding wages; no discrimination because of employees' membership in any group or organization, concerning employee representation on labor problems; elimination of any management representatives on employee labor groups; and preference for older employees in service, skill and capability considered, in lay-offs and re-hiring.

The company proposed to meet with any group of its employees, discuss any grievances they might have and give prompt definite answers.

According to Coleman C. Claherty, president of the United Rubber Workers council, the actual basis for the strike lay in the Bedaux system, which is in operation at practically every major rubber factory. The strike was settled after outside mediation had failed. Ralph Lind, secretary of the Cleveland Regional Labor Board, spent several days attempting to bring both factions together but withdrew on July 8.

Plants of the General concern are now in full production with more than 1400 factory workers again at their posts, in addition to 500 office workers who did not walk out but were affected by the strike.

Financial News

UNITED STATES RUBBER HAS PROFIT OF $26,588

For the first time since 1929 the United States Rubber Company, New York City, shows a profit for a six month period. Net sales for the first six months of the fiscal year ending June 30, amounted to $52,495,958, an increase over the corresponding period of 1933 when net sales amounted to $36,494,680.

Profit from operations, after deducting interest on funded indebtedness amounted to $3,018,948. Deducting $2,992,360 against depreciation left a net profit of $26,588 for the first six months of the current year. In 1933 the company showed a loss of $3,419,304 for the corresponding period, while the same period of 1932 resulted in a loss of $5,028,399.

In addition to the profit recorded, the U. S. Rubber Plantations, Inc., a subsidiary organization, had a profit of approximately $390,000 after all charges including provision for depreciation and amortization amounting to $812,000. This profit was not included in the United States Rubber Company statement released by F. B. Davis, Jr., chairman of the directorate, on August 1.

MONSANTO CHEMICAL CO. EARNS $1,379,035 PROFIT

Monsanto Chemical Company, St. Louis, Mo., and subsidiaries, report a net profit of $1,379,035 for six months ending June 30, 1934, after charges, depreciation, depletion and federal taxes were deducted. Net earnings of the company for the second quarter of the year were $704,918. This is equal to approximately 81½c a share on the 864,000 shares outstanding.

Holders of Monsanto capital stock earned $1.59½ per share outstanding for the first six months of 1934, compared with 98c a share for the corresponding period in 1933.

At the regular meeting of the Board of Directors, held during the week of July 26, the regular quarterly dividend of 25c per share was declared, payable September 15, 1934, to all stockholders of record on August 25.

Declares Regular Dividend

Norwalk Tire & Rubber Company, Norwalk, Conn., has declared the regular quarterly dividend of 87½c per share on the $50 par preferred stock, according to the *Wall Street Journal*. The dividend is payable on October 1 to stock of record September 21, 1934.

India Stock Transfer

Attorney Paul C. Weick, acting for the reorganized India Tire Company, Akron, Ohio, advises that August 25, 1934, is the deadline for transfering stock in the former India Tire & Rubber Company, to the reorganized concern, under terms of the plan effected last spring. Stockholders who fail to present their certificates for transfer by such date will be unable to do so thereafter without special permission of the reorganized tire company.

Under the plan common stockholders of the old company will receive share for share of the new firm's common stock. Creditors who were not paid in cash are awarded first preferred stock in the company. Bondholders of the former India Tire & Rubber concern receive second preferred stock in the India Tire Company.

FISK RUBBER REPORTS FOR SECOND QUARTER

Fisk Rubber Corporation, Chicopee Falls, Mass., and subsidiaries, report a net income of $252,481, for the second quarter ending June 30, 1934, after deducting all charges. This is equal to 43c a share on 447,356 common shares ($1 par) outstanding on December 31, 1933, after dividend requirements on 39,459 six per cent. preferred shares.

In the preceding quarter net income totaled $120,287, which was equal to 13c a common share. Total net income for the first six months of 1934 is $372,768 or 57c per common share outstanding.

A separate account in the report for the second quarter for "export accounts in liquidation" showed a net loss for the quarter ended June 30, 1934, of $11,929 against net loss of $1,031 in the preceding quarter, making a total net loss of $12,960 for the first six months of 1934, which was transferred to reserve.

Firestone Declares Dividend

Firestone Tire & Rubber Company, Akron, declared the regular quarterly dividend on 6% cumulative preferred stock on July 27. The dividend, amounting to $1.50 per share, will be payable on September 1 to holders of record August 15. The previous week, holders of Firestone common stock received checks for approximately $200,000 which represented a dividend of 10 cents per share payable to stockholders of record July 5.

Raybestos-Manhattan Report

A preliminary statement released by Raybestos-Manhattan, Inc., Passaic, N. J., for the six months ended June 30, 1934, shows net income of approximately $719,800 after all deductions. This profit is equivalent to $1.12 per share on 642,600 no-par shares of capital stock, comparing with 36c a share on 642,900 shares in the corresponding period of 1933. Net income for the month of June was approximately $139,100 after taxes and charges.

Lee Pays 20c Dividend

Lee Rubber & Tire Corporation, Conshohocken, Penna., paid a dividend of 20c a share upon its outstanding capital stock on August 1 to stockholders of record on July 16, 1934, according to a statement issued by A. A. Garthwaite, general manager of the company. The organization is now 51 years old and operates two separate factories.

CONSUMPTION IN JUNE DROPS 6.4% BELOW MAY

Consumption of crude rubber by manufacturers in the United States for the month of June amounted to 40,242 long tons, which compares with 43,012 long tons for May. June consumption shows a decrease of 6.4% under May and 20.7% below June a year ago, according to statistics released by the Rubber Manufacturers Association. Consumption for June (1933) was reported to be 50,743 (revised) long tons.

Imports of crude rubber for June were 49,683 long tons, an increase of 3.6% over May and 118.6% above June 1933.

Total domestic stocks of crude rubber on hand June 30th, were 358,149 long tons, which compares with May 31st stocks of 351,329 long tons. June 30th stocks show an increase of 1.9% above May 31st stocks, and 6.5% above stocks of June 30th.

The participants in the statistical compilation report 46,698 long tons of crude rubber afloat for the United States ports on June 30th, compared with 57,921 long tons afloat on May 31st, this year, and 63,608 long tons afloat on June 30, 1933.

June reclaimed rubber consumption is estimated to be 9,459 long tons, production 10,820 long tons, and stocks on hand June 30th, 23,664 long tons.

Fire Destroys Rubber Factory

Fire destroyed the main building of the Braintree Rubber Cement Company, Braintree, Mass., on July 30. Damage was estimated at $30,000. The flames were further encouraged by explosions of naphtha and benzol which resulted in thick waves of smoke.

Tire Division Wins Trophy

The tire division of the B. F. Goodrich Company, Akron, has been awarded the John Noonan safety trophy for its accident prevention record during the first six months of 1934. The trophy is awarded each year to the Goodrich division showing the best results. The trophy must be awarded to the same division for three years before permanent possession may be accomplished.

Standard Starts Production

Production has started in the Port Clinton, Ohio, plant of the Standard Products Company, manufacturers of channel rubbers for the airplane industry. The company recently took over the factory formerly used by the Wildman Rubber Company, moving its machinery from Cleveland for the purpose. G. E. Duffy is general manager.

O'Sullivan Sales Increase

For the six month period January 1 through June 30, 1934, the O'Sullivan Rubber Company, Inc., reports total sales of $837,327 representing actual deliveries and not including unfilled orders on hand. This compares with sales of $578,613 for the corresponding period in 1933, an increase of more than 45 per cent. An increase in prices to the repair trade on ½-inch men's rubber soles from 88.22c to 95.89c became effective on July 15.

NEW ENGLAND NEWS

Fisk Rubber Corp., Chicopee Falls, Mass., has set up an interesting exhibit of its products in the Springfield, Mass., union railroad station. Passenger car, truck and bicycle tires are featured, with specimens of 21 different chemicals and compounds, used in tire manufacture, arranged on trays and in bottles. There are also piles of crude rubber in both pale crepe and smoked sheet form, with placards describing process of manufacture.

Slubber, intermediate and fine roving, cord, raw cotton, picker lap, card and drawing sliver are also exhibited, each properly identified. A placard states that the average tire production of the company is 8,500 per day and the average number of employes 2,000.

Tennis departments of the United States Rubber Company at Naugatuck, Conn., were scheduled to close August 10 for four weeks, resuming operation September 5, under the terms of a notice issued by Factory Manager Walter H. Norton, who stated that a slump in orders made the step necessary.

Waterproof and general products departments were not affected by the closing notice, which, in explaining fabric shoe sales had fallen below the sales estimate, pointed out that "competitors selling their canvas footwear below our costs, have taken business." When the department reopens in September, only 60 per cent of the present force of 400 canvas footwear makers will be taken back, it is explained.

Employes of the Armstrong Rubber Company, West Haven, Conn., tire plant, held their annual outing July 14 at Indian Grove, under sponsorship of the Armstrong Bowling League. Cash prizes for athletic events were donated by James A. Walsh, president of the company, and Frederick Machlin, treasurer.

Jesse M. Bailey of West Hartford, Conn., has been elected president of the Alling Rubber Company, operating a chain of rubber goods stores, to fill the vacancy caused by the death of Amos P. Mitchell. He will also serve as treasurer and general manager. Walter A. Decker, Holyoke, Mass., is vice-president and Merwin S. Bronson, Waterbury, Conn, secretary.

The Employees' Association of the Seamless Rubber Co., New Haven, held its annual outing August 4 at Lake Compounce, Bristol, Conn., with an attendance estimated at 3,000, including employees and their families. Forty-five buses and several hundred private automobiles, with a state police escort, provided transportation to Bristol.

The asbestos plant of the Russell Mfg. Co., Middletown, Conn., in Middlefield, Conn., has been leased to the Southern Asbestos Corp., which will continue operation of the mill as a unit of the Southern concern, which has plants in Charlotte, N. C., and Trenton, N. J. William L. Truesdell, superintendent of the asbestos mill at Middlefield for 15 years, has retired from that post and will not be connected with the Southern corporation.

Officials of the Goodyear Rubber Co., Middletown, Conn., makers of waterproof footwear, have maintained silence concerning the company's participation in an effort to test the legality of the price-listing requirement of the Rubber Code.

BRITISH DISAGREEMENT OVER TIRE PRICE RISE

A hitch has occurred in the discussions among tire manufacturers in the United Kingdom which have been taking place with the object of drafting a higher schedule of prices. It is reported that while all the British manufacturers are satisfied that a rise is fully justified by the increased cost of rubber and cotton fibre, one important foreign concern, which manufactures on a large scale in the United Kingdom, refuses to accept the proposed new scale.

Fortunately for the tire manufacturers, most of them foresaw the probability of dearer rubber a year or so ago and stocked heavily. Consequently, they are still using comparatively cheap rubber in meeting their current commitments. However, the raw material now being purchased is costing 7d. (14 cents) per lb., and it will enter their manufacturing program before very long. Naturally, the chances of agreements about an increase in tire prices will be improved as stocks of rubber purchased cheaply are worked off.

Hankins Rubber Strike Ends

The strike at the Hankins Rubber Company, Massillon, Ohio, which started on June 20, was ended on July 30 when workers returned to their tasks. Agreement between manufacturer and employees was brought about by Frederick Keightly, conciliator of the department of labor. Workers received a 20 per cent wage increase.

British Rubber Works Burns

Damage estimated officially at £75,000 ($375,000) was caused by a disastrous fire which occurred late in July at the works of the North-Western Rubber Co., Litherland, near Liverpool, England.

Factory for Travancore

The government of Travancore, India, has decided to erect a rubber factory in that territory as a direct result of the restriction scheme. Travancore's share of rubber export will be 70 per cent of the basic quota for India alloted by the restriction plan. The territory has approximately 60,000 acres of rubber and intends to use much of the output from that acreage in the planned factory.

24-Month Tire Guarantee

Answering Goodyear and Firestone, both of whom increased tire guarantees to one full year last month, the Pharis Tire & Rubber Company, Newark, Ohio, is offering a newly developed tire, termed the First-Line Roadgripper, with a definite guarantee of up to 24 months. Guarantees on other tires produced by the firm range from 12 to 24 months.

Rubber Workers Vote Strike

Workers of the American Hard Rubber Company, Akron, voted to strike on July 19, according to C. E. Davis, president of the local union in that city. Davis stated that the principle consideration for the strike was the conflict between his local and the American Hard Rubber Association, the latter being accused of acting as a "company union." 450 persons are employed at the Akron plant.

Rubber Latex in Cosmetics

Under the trade name of Dermalac, the Heveatex Corporation, Melrose, Mass., recently introduced a new concentrated rubber latex material which it is recommending for the compounding of creams, massages, mask preparations and similar cosmetic products. Dermalac is said to liquefy upon heating, to be free from ammonia odor and to possess good cleansing properties.

Optimism Reigns at Luncheon

With an attendance twice as large as the previous year the Incorporated Society of Planters held their annual luncheon on July 6 at the Criterion Restaurant, London, England. Sir Philip Cunliffe-Lister, the Secretary of State for the Colonies, was the chief guest. The few speeches heard during the affair were highly optimistic in tone, differing from the cautious notes of previous luncheons.

TRENTON NEWS

Hamilton Rubber Company, of Trenton, is erecting a factory addition, 22 by 45 feet, to cost $2,000.

Bruce Bedford, president of the Luzerne Rubber Company, Trenton, is touring Europe with his wife. Their son, Bruce Bedford, Jr., sailed from San Francisco for the Hawaiian Islands, where he is spending the summer months.

Mercer Rubber Company, Hamilton Square, announces a 10 per cent increase in prices of goods.

S. H. Renton, general manager of the Vulcanized Rubber Company, Morrisville, Pa., has returned from abroad where he spent several weeks.

Thermoid Company, Trenton, continues busy and may erect several small additions to take care of increased business.

An increase in prices of some lines of goods has been announced by the Joseph Stokes Rubber Company, Trenton.

Names in the News

DR. H. L. TRUMBULL, of the B. F. Goodrich Company, was elected chairman of the Akron section of the American Chemical Society at the annual meeting of that organization recently. He succeeds GEORGE HINSHAW of the Goodyear Tire & Rubber Company.

T. M. MAYBERRY has been appointed treasurer of the Firestone Tire & Rubber Company of Canada, Ltd. For the past six years he was associated with the treasurer's department in the Akron offices of the tire firm.

A. W. CARPENTER, manager of the B. F. Goodrich testing laboratories, has been re-elected secretary of the committee on rubber of the American Society for Testing Materials.

HENRY C. SWEARINGEN, associated with the Kelly-Springfield Tire Company for seventeen years, has been promoted to the general sales managership of that concern. For the past ten years he has been serving as branch and division manager for the Middle West.

ARTHUR REEVE, an employee of the United States Rubber Company, was recently given a certificate of recognition by F. B. DAVIS, JR., president, in commemoration of fifty consecutive years of service. Mr. Reeve was footwear production and sales manager for many years.

E. D. NEWTON, of the research staff, B. F. Goodrich Company, Akron, is now establishing laboratories in the heart of the Far East rubber producing districts and will conduct experiments there for the next two years.

W. K. BROWN, associated with the Buenos Aires, South America, branch of the Firestone Tire & Rubber Company, has returned to the States with Mrs. Brown for a three and one-half months' vacation.

C. R. COOMBER has been appointed a director of P. B. Cow & Company, Ltd., rubber manufacturers of London, England He is also general manager of the company.

W. P. SCHNEIDER, B. F. Goodrich Company safety engineer, is aiding in drawing up an elevator safety code for the State of Ohio. He recently visited Columbus for this purpose.

G. H. SEYBOLD, formerly with the U.S. Rubber Company for sixteen years as general manager of the Sumatra plantations of that concern, has been appointed head of the rubber department of Munds, Winslow & Potter, members of the Commodity Exchange.

L. A. MURPHY, Goodyear Tire & Rubber Company, Akron, was in charge of arrangements for a golf tourney of the purchasing agents of Akron, held recently in that city.

WILLIAM H. BASSETT, American Brass Company, Waterbury, Conn., recently elected to the presidency of the American Society for Testing Materials, died on July 21, three weeks after his election.

John Calbeck Joins A.Z.O.

John H. Calbeck formerly Director of Research for the Eagle-Picher Lead Company, and since 1927 engaged in private research and conducting a consulting business at Joplin, Missouri, has moved his laboratories to Columbus, Ohio, where he has become associated with the American Zinc Sales Company. Mr. Calbeck will conduct special research on pigment development.

According to A. C. Eide, sales engineer for the American Zinc Sales Company, the acquisition of Mr. Calbeck by the technical organization marks another progressive step in enlisting a high grade personnel to develop and improve pigments for the paint and rubber trade.

K. D. SMITH, technical superintendent, tire division, B. F. Goodrich Company, conducted a series of conferences of technical employes of the company from both domestic and foreign plants, at the Akron headquarters during mid-July.

EDGAR E. HELM, counsel for the General Tire & Rubber Company, Akron, was named head of a committee of 15 leading business men in Akron to make recommendations for putting the city on a "sound financial basis" after a study of local finances. He was appointed on July 6.

Kitchel and Smith Feted

A luncheon was tendered on Thursday, July 19, to Allan F. Kitchel and Norman L. Smith, vice-presidents of the Binney & Smith Company, New York City, by the employees of that concern, commemorating the twenty-fifth anniversary of their connection with the carbon black manufacturers. The luncheon was held at the Uptown Club in New York with about thirty department heads and their assistants in attendance. W. B. Wiegand was toastmaster of the affair. Speeches were made by Messrs. Kitchel and Smith, in addition to Edwin Binney, co-founder of the company.

GERALD F. DURYEE resigned his position as manager of the mat department for the Ohio Rubber Company, Willoughby, Ohio, to join the Owen Specialty Company, Canton, manufacturers of rubber specialties, as factory superintendent. CLIFFORD PAISLEY has also joined the Owen concern in an executive capacity.

HERMAN L. BARNES, formerly manager of the Canton, Ohio, Chamber of Commerce, has joined the General Tire & Rubber Company, Akron, in an executive capacity. Mr. Barnes acted as NRA administrator in Canton for the past year and a half.

Lt. Commander KARL LANGE and VERNER SMITH, both associated with the Goodyear Tire & Rubber Company, Akron, for many years, flew the Goodyear VIII in the National Balloon races held in Birmingham, Alabama, on July 28. The Goodyear balloon, built in 1929 of light, single-ply fabric, landed early in the race, it being the first time in five entries that Goodyear did not end up well in the fore of the race.

Wiegand Returns from World Trip

W. B. Wiegand, technical director, Binney & Smith Company, New York City, returned to the United States late last month after journeying around the world on a four months tour. His itinerary included Japan, China, Malaya, Italy, France and England.

Leaving Vancouver in March Mr. Wiegand spent several weeks in Japan where he was duly impressed with the amount of rubber research being conducted in that country along both theoretical and practical lines. He addressed meetings of the Rubber Manufacturers Associations in both Kobe and Tokyo.

Visiting China, of which Shanghai is the rubber center, Mr. Kuo-Chang Chen, chemist and engineer of the Dah Yung Rubber Company, Ltd., acted as his translator, introducing him to hundreds of rubber chemists and manufacturers. In Mr. Wiegand's estimation China is most eager to adopt the latest improved methods of manufacture and rubber machinery. Hong Kong was another of his stops.

At Malaya he was conducted through the Singapore Rubber Works, a modern factory which has paid dividends throughout the depression, by Mr. Huisken, managing director of the company. An interview with the Hon. Tempany, Director of Agriculture, I. R. I., led to a discussion of the possibility of closer liaison between rubber growers and manufacturers, a matter which Mr. Wiegand proposes to discuss with members of the Rubber Division, A. C. S., at the September meeting in Cleveland. At a combination meeting of the Rubber Research Institute and the local section of the Institute of Chemistry at Kuala Lumpur, F. M. S. he led a discussion on "The Structure of Rubber."

Early in June Mr. Wiegand visited Milan, Italy, and met Dr. Giuseppe Bruni and the latter's staff at the Pirelli Company works. He also met other rubber technologists from various parts of Northern Italy at a luncheon.

Numerous visits were made by Mr. Wiegand on chemists during his visit to France. Leaving for England he gave short talks in London and Birmingham, repeating his discussion on "The Structure of Rubber" before a number of executives at a private supper in London. It is believed that the substance of that subject will appear in a forthcoming issue of the Journal of the Institute of the Rubber Industry. He also enjoyed visits with Dunlop and Goodyear engineers in Birmingham.

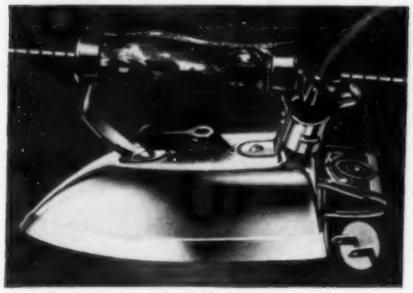
Sailing from Liverpool Mr. Wiegand landed at Montreal thus completing a combined business and pleasure trip which, in his estimation, should be taken by every leader in the rubber industry to more fully acquaint them with actual conditions throughout the world.

Mr. Wiegand predicts that the Orient will become a dwindling market for foreign goods in the next decade or two because that territory is fast becoming able to furnish its own needs. He found that workmen in the Orient work longer, are well paid in accordance with their standard of living, eat and sleep well, and have the advantage of proximity to raw material plus the availability of modern machinery. The local market is increasing rapidly.

New Rubber Goods

Electric Iron Uses Rubber

A merchandising novelty has made its appearance on the Mastermatic line of electric irons sponsored by the Westinghouse Electric & Manufacturing Company, E. Pittsburgh, Penna. These irons are supplied with cushioned rubber "fatigue-proof" handles thus easing the housewife's task. The iron weighs 4½ pounds and is easier to move around because of the rubber handle.



Rubber Now Used in Putty

B. F. Goodrich Rubber Company, Akron, has announced a compound similar in appearance and consistency to ordinary painters' putty termed "Plastikon" Putty. The compound is combined with rubber, giving it advantages not found in the ordinary product. It requires no mixing, containing practically no oil; effectively resists corrosive chemicals and fumes; offers high resistance to moisture because of the rubber content; and has a high degree of adherence to steel surfaces. It is being marketed in 15, 75 and 225-pound cans as well as in small pint cans, the latter size for household use.

Latex Bathing Helmets

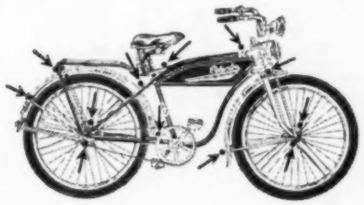
Said to be lighter in weight than the ordinary bathing cap, while maintaining strength and elasticity, the Dunlop Rubber Company, Ltd., England, has introduced a bathing helmet made of latex. Included among the features claimed for this new item are the elimination of ridges on a waved pattern, adjustability of the detachable chin strap, completely watertight without bearing pressure on the ears. To make the helmet, long arms with perfect shaped heads suspended are lowered into vats of latex, re-appearing covered with various colors of rubber, thus shaping the helmet. They are then dried, cured and stripped. After washing, polishing, trimming and fitting straps the helmets are ready for marketing.

New Seating Principle

Based on the claim that the supporting action of a chair should be so constructed that the weight is diffused throughout the area of the seat, a new seating principle, known as "Tuberspension" has been patented by H. F. Ollis, Ashland, Mass. The chair seat consists of a resilient pad resting upon a supporting panel with a U-shaped opening which prevents the major seat bones of the occupant from coming into direct, hard-pressure contact with the solid parts of the seat. The inventor uses and recommends sponge rubber as the resilient matter called for in the construction, believing "no other material operates so well" for the "Tuberspension" principle.

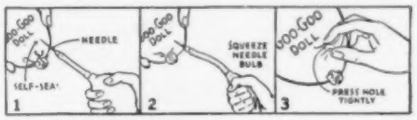
Rubber Mountings on Bicycle

The first bicycle to be mounted in rubber has been introduced by the Westfield Manufacturing Company, Westfield, Mass. These mountings, indicated by the arrows in the illustration, deaden sound and decrease any possible rattles. The mountings at the front and rear axle are designed to permit the same metal-to-metal contact essential for permanent adjustment and yet provide a silencing feature not possible in any other method.



Reinflatable Rubber Doll

Due to the fact that "Goo-Goo" dolls, manufactured by Thornecraft, Inc., Chicago, are made of a specially processed and thicker rubber stock than the average rubber doll, it is impossible for the company to adopt any air-stem valve for reinflating purposes. Therefore deflated "Goo-Goo" dolls were a sales problem. This problem has now been overcome by the company by the following reinflation method:— a pure gum-rubber seal is cemented inside the wall of the doll thereby permitting it to be punctured within the area of this inner seal by means of a small "hypodermic" needle with an atomizer bulb attached to pump in new air. When the needle is withdrawn the minute hole is hermetically sealed by pulling the threads of the pure gum through the point of perforation. The illustration shows the three steps during the reinflating procedure.



Rubber Molds in Novelty

The Picture Casting Shop, a new novelty introduced by Victor Craftsmen, Inc., includes three rubber molds in addition to other materials necessary for the molding of a variety of plaques. The George Borgfeldt Corporation, New York City, are sole distributors for the novelty.

Self-Ventilating Tire

Introducing a new manufacturing principle the Pennsylvania Rubber Company, of Jeannette, Penna., has announced its new Self-Ventilating High Pressure Truck Tire. By eliminating the series of cross bars bridging or tying together the channels or grooves in the center of the tread air is permitted to "stream" circumferentially without obstruction. By cutting extra-wide, extra-deep grooves between the spear-head tread blocks running down the sidewall, at which point the greatest heat is usually encountered, "air pockets" are created. As the tread revolves air whirls around in these interstices like an eddy. This series of air whirlpools keep the tread shoulder cool in addition to penetrating deep into the fabric thus keeping the internal carcass equally cool.

GOODYEAR TO BUILD PLANT AT BATAVIA, JAVA

Goodyear Tire & Rubber Company, according to a statement issued by Paul W. Litchfield, president, at Amsterdam, on July 13, will soon construct a complete rubber factory at Buitenzorg, near Batavia, Java. Mr. Litchfield has just returned from Europe from a combined business-pleasure trip.

When the plant is erected it is expected to employ about 600 people. The Goodyear company owns and operates a rubber plantation in Sumatra and consumption of the rubber cultivated there will probably be absorbed by the new factory. Mr. Litchfield did not dehy the statement that the decision to build in Java had been accelerated by Japanese competition, according to the report.

RUBBER EXPORTS IN JUNE HIGHEST SINCE YEAR 1931

Exports of rubber products from the United States during June were valued at $2,182,963, the highest value recorded for any month since November, 1931, reports the Department of Commerce.

This total compared with $1,958,241 in May and $1,261,591 for June of last year. Shipments of automobile tires and tire sundries amounted to $1,274,526 in June against $1,195,983 in the previous month. Export trade in rubber goods by this country in the first six months of this year totaled $10,922,496 compared with $7,203,905 in the like period of last year.

New Factory in Philippines

A new rubber factory has been established in the Philippine Islands by Japanese interests, the Department of Commerce has been notified by its Manila office. Located at Cebu the operating concern is known as the Health Rubber Company. It is manned by Japanese technicians, and is said to be producing a minimum of 2,000 pairs of canvas rubber-soled shoes daily. Crude rubber requirements of the new plant are being filled by one of the largest Philippine rubber plantations, according to the report received.

Cooling System for Pharis

Pharis Tire & Rubber Company, Newark, Ohio, has installed two deep-well turbine pumps, each delivering 750 gallons of water per minute, for the air-cooling system recently installed at the plant. Installation was made with Deming pumps by the Lieb Power Construction Company, Columbus, Ohio.

Goodrich Conducting Search

B. F. Goodrich Company, Akron, is conducting a nation-wide search to find the individual who first proposed the use of white safety lines down the center of American highways. A worthy tribute awaits the person being sought.

Ohio Rubber Company Busy

A total of 825 men and women are now employed at the Willoughby, Ohio, plant of the Ohio Rubber Company. Production has been better than was anticipated for the month of July, according to Raymond A. Mertz, plant superintendent.

Obituaries

Frank H. Meyer

Frank H. Meyer, appointed vice-president and general manager of the Adamson Machine Company, Akron, last March, died at his home in Cuyahoga Falls, Ohio, on

June 16. Death came suddenly to Mr. Meyer who was born in 1883. He was a member of the Society of Automotive Engineers and well known in the rubber industry. Funeral services were held in Cleveland on June 20. He leaves a widow and daughter.

Clarence Kenyon

Clarence Kenyon, founder of the C. Kenyon Company, manufacturers of rubberized goods and raincoats, died at his home in Poughkeepsie, New York, on July 30, after a long illness. He was 88 years old. Funeral services were held at his home with interment in Greenwood Cemetery, Brooklyn, N. Y., his native town. He leaves four daughters.

George Vernon Sheffield

George Vernon Sheffield, senior vice-president and treasurer of Innis, Speiden & Company, New York City, died on July 19 after a brief illness. Mr. Sheffield joined the chemical house in 1878 and was actively identified with its progress for 56 years.

Arthur B. Hamby

Arthur B. Hamby, general manager of the chemical plant of the Federated Products Corporation, manufacturers of red oxide of iron, died July 16 at New Brunswick, N. J. Death was attributed to a cerebral hemorrhage. Mr. Hamby was 43 years old. He is survived by his widow.

Miller Sales Office Moved

Sales offices of the Miller Rubber Products Company, Akron, have been moved to the Fifth Avenue Building in New York City. Visiting buyers are welcomed at the new offices.

GENERAL TIRE INSURES ALL COMPANY WORKERS

Every employe of the General Tire & Rubber Company, Akron, will shortly receive a gift from the company in the form of a $1,000 life insurance policy. 2,200 employes benefit, including all office workers, factory hands and branch representatives. Premiums will be paid wholly by the General concern, according to William O'Neil, president.

At the same time the firm launched a comprehensive health program. It will share with employes who care to take advantage of it the cost of group accident and health coverage which provides weekly payments for disability resulting from sickness or non-occupational accidents. Insurance privileges are made available to all employes who have been in the service of the company for six months or more.

WASHINGTON DELAYS RUBBER EMBARGO ACT

According to Representative D. W. Harter, the American hot water bottle and rubber doll industries are seriously threatened by invasion of Japanese competition. The Asiatic manufacturers can and are selling these products approximately one-third below prices instituted by American producers.

Representative Harter, early in July, made an urgent appeal to Washington government officials for an embargo on Japanese rubber sundries, but to date has failed to elicit any response from the authorities.

Hold Sales Conference

The sales force of the Farrel-Birmingham Company, Inc., met at the company's offices at Ansonia, Conn., recently, for the annual sales conference. The conference opened with an address by President N. W. Pickering, in which he reviewed the business of the past year, the prospects for the ensuing year and discussed the NRA codes and their effect on sales.

Following sessions were devoted to discussions of the various products manufactured by the company, the latest developments being explained by the sales and engineering department heads. A general golf tournament was held during the week, followed by an informal dinner.

Install New Machinery

A new calender, hydraulic pressure equipment and another pressure steam boiler are all being installed at plant of the Wooster Rubber Company, Wooster, Ohio. The new battery of machines is necessary for the manufacture of a complete line of patented molded rubber goods shortly to be produced by the Wooster concern, now producing rubber balloons.

Tire Production Increases

Approximately 300 tires are being turned out daily in the plant of the Henderson Tire & Rubber Company, Bucyrus, Ohio, according to C. O. Henderson, president. Production may be stepped up shortly to 500 per diem. The plant is now operating 24 hours a day and employs seventy-five men.

REVIEW SHELF

• Monthly Review of New Books, Pamphlets, Company Catalogs, Service Bulletins, House Organs, etc., Pertinent to the Industry.

CHEMICAL GUIDE BOOK. Published by Chemical Markets, Inc., 25 Spruce Street, New York City. 695 pp. 1934. $2.

The Tenth Edition of this chemical guide is divided into four sections and includes a catalog of leading chemical firms; a buying guide and directory of chemical and allied products arranged alphabetically with names and addresses of sources of supply; a geographical directory of the chemical and allied industries; and a chemical statistics section showing high and low prices for the years 1932 and 1933 on more than 1,500 heavy and fine chemicals, intermediates and allied products. A detailed list of trade associations in the chemical and allied industries is also included in the concluding pages of the guide book.

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RUBBER: A STATISTICAL APPRAISAL. Published by F. R. Henderson, 25 South William Street, New York City. 7 pp. 1934. For free distribution.

Replete with maps, charts and diagrams, Mr. Henderson's latest survey of the rubber industry attempts to dispel the doubts and fears which still persist in the minds of some connected with the industry. This appraisal analyzes several important factors that bear a relationship to prevailing conditions since the enactment of the new restriction scheme. Detailed figures on world consumption and absorption of rubber occupy the major portion of the appraisal.

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THREE ROLL MOTOR-DRIVEN CALENDER. Published by William R. Thropp & Sons' Company, Trenton, N. J. 3 pp. 1934. For free distribution.

A bulletin describing briefly the advantages contained in the three roll motor-driven calender machine offered by the Thropp concern. Mention is made of the features of the rolls, frames, boxes, gears, motor, guards, controls, and other parts of the calender machine. The Thropp company has been in existence since 1888.

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GENERATING SETS. Published by Troy Engine & Machine Company, Troy, Penna. 32 pp. 1934. For free distribution.

Replete with illustrations covering vertical and horizontal engine driven machines this attractive catalog points out the application of both direct and alternating current machines in various industries. Opportunities are discussed for reducing power costs in stationary plants by engineers of the company which has been manufacturing generators for thirty-five years. These generators are sold under the trade name "Troy-Engberg."

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1934 YEAR BOOK & CODE GUIDE—of the National Association of Waste Material Dealers, Inc. Published by the Association, Times Building, New York City. 286 pp. 1934. $2.

Carries all the approved classifications covering the waste material trade, a special wood pulp section, all trade customs of the waste material trade, special code sections and the personnel of many code authorities. Standards of scrap rubber specifications and packing of the Rubber Reclaimers Association, Inc., are contained in the volume, in addition to the Code of Fair Competition for the reclaimed rubber manufacturing industry. The book accomplishes its purpose as a guide to waste material dealers and allied industries.

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PRIVATE INITIATIVE *versus* PLANNED ECONOMY. Published by the Farrel-Birmingham Company, Inc., Ansonia, Conn. 12 pp. 1934. For free distribution.

A defense of private initiative by Allen W. Rucker in collaboration with N. W. Pickering, president of Farrel-Birmingham Company, Inc. Factors retarding trade recovery, in the opinion of the authors, are discussed in this little booklet including such topics as governmental tinkering with industry, restriction of machinery and attempted regimentation. A complete chapter is devoted to the problem of purchasing power in relation to the average worker.

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ELEVENTH ANNUAL REPORT—of the Technical Department of the International Association for Rubber and Other Cultivations in the Netherlands Indies. Published by the Association. 12 pp. 1933. For free distribution.

Experiments conducted by technologists of the International Association during 1933 dwelt particularly with the mixtures of rubber and asphalt. Generally these two liquids can be mixed together in any proportion with the exception of certain emulsions where a homogenous mixing can only be obtained after the addition of protective colloids or stabilizers. Investigations relating to asphalt rubber mixtures, obtained after evaporation of the mixture of liquids, showed that the properties of the original asphalt improved in the rise of melting point, diminished tendency to flow, increased resistance against pressure, increased resiliency and increased adhesive power to gravel. A rubber powder prepared with dextrine proved easily to absorb moisture from the atmosphere. Tests were conducted in connection with chlorinated rubber. Another series of tests were conducted with building boards of latex and fibrous materials and data collected as regards machinery with which these products can be made. Brief mention is made in the report of these and other experiments made during 1933.

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SALARY STANDARDIZATION AND ADMINISTRATION. Published by the Policy-Holders Service Bureau, Metropolitan Life Insurance Company, New York City. 40 pp. 1934. For free distribution.

Another comprehensive report prepared by the Metropolitan Life Insurance Company devoted to salary problems in large corporations. According to the report, which includes charts and suggested forms, few organizations have attempted to evolve regular procedure with reference to salaried positions although considerable progress has been made in developing scientific control of the pay of wage earners. It is recognized that the success of salary standardization depends upon the intelligence with which jobs are evaluated and classified. The report describes methods upon which success has been accomplished and which may be accomplished. Actual practices of several companies are cited.

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SUPPLY AND DEMAND. Published by F. R. Henderson, 25 South William Street, New York City. 3 pp. 1934. For free distribution.

A brief discussion of supply and demand in the rubber industry based on the recent restriction agreement. Mr. Henderson favors restriction and points out factors in its behalf referring to the fact that world production of raw food materials has increased far more rapidly than increase in population, yet the demand has kept pace with the supply. World stocks of basic commodities are tabulated in the survey including cotton, silk, tin, lead, silver, petroleum, sugar, tea, wheat, and of course, rubber.

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RUBBER. Published as a special section of the July 16 issue of The Financial News, 20 Bishopsgate, London, E.C. 2, England. 32 pp. 1934.

Each year The Financial News publishes this special section devoted to rubber and rubber products. The current edition carries a number of interesting articles including "The Rise of the Rubber Industry," by H. Eric Miller; Rubber Regulation, J. G. Hay; Research and the Plantation Industry, Sir Herbert Wright; Latex—Its Nature and Method of Extraction, G. E. Coombs; and additional timely articles written by internationally known rubber authorities.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, AUGUST 9, 1934

Crude Rubber

THE rubber market has shown considerable activity since our last report with quotations exceeding the 15 cent mark early this month. The range in July was narrow, varying between 14 and 14⅞ cents with an average of 14⅝ as compared to 13½ cents for June. Despite some profit taking, there has lately appeared a strong buying movement which brought a rise of 30 to 35 points on the exchange early this week. Factory buying has again been in evidence, after an absence of some time, but its effect on the market was negligible. Speculative interests re-entered the market this week and forced covering in trade quarters, resulting in the heaviest volume of trade on the exchange in months. Interest was shown in the report that native rubber exports are being kept in check and within the limits of their quota. Quotations in the outside market, Exchange, London and Singapore follow:

As of August 8

Plantations—

Ribbed Smoked Sheets—			
Spot	—	@	.15⅜
August	—	@	.15⅜
September	—	@	.15½
Oct.-Dec.	—	@	.15⅝
First Latex, crepe spot	—	@	.17⅛
Amber Crepe, No. 2	—	@	.12½
Amber Crepe, No. 3	—	@	.12⅜
Amber Crepe, No. 4	—	@	.12
Brown Crepe, clean thin	—	@	.12½
Brown Crepe, rolled	—	@	.09½

Latex—

Liquid Latex, per gal.	.60	@	—

Paras—

Up-River, fine	—	@	.12
Acre Bolivian, fine	—	@	.12¼

Balata—

Block, Ciudad	—	@	.50

LONDON MARKET

Standard Smoked Sheets—Buyers—Aug. 8			
August	—	@	7 3/4d
September	—	@	7 7/16d
Oct.-Dec.	—	@	7 7/16d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—Aug. 8			
August	—	@	7 3/16d
Oct.-Dec.	—	@	7 1/16d

Reclaimed Rubber

Reclaim prices continue at last month's levels but with the present trend of the crude rubber market a rise is predicted before long. Reclaimers have been signing up a number of contracts until the end of the year at present levels. It would appear that these quotations have great intrinsic value which will become more apparent before many months. The usual summer lull has quieted down reclaimers' operations but a pick-up is looked for next month. Current prices follow:

High Tensile

Super-reclaim, black	lb.	.08¾ @	.09
High Tensile Red	lb.	.07 @	.07¼

Shoe

Unwashed	lb.	.06½ @	.06¾
Washed	lb.	.08 @	.09

Tube

No. 1 (Floating)	lb.	.13 @	—
No. 2 (Compounded)	lb.	.07½ @	.07¾

Tires

Black	lb.	.05 @	.05¼
Black, selected tires	lb.	.05¼ @	.05½
Dark Gray	lb.	.06¼ @	.06½
White	lb.	.09¼ @	.09½
Truck, Heavy Gravity	lb.	.05½ @	.06
Truck, Light Gravity	lb.	.06 @	.06¼

Miscellaneous

Mechanical blends	lb.	.04¼ @	.04½

Scrap Rubber

The market for scrap is comparatively quiet as reclaimers appear to be fairly well stocked. However there has been an increase in export shipments with the result that the domestic surplus is being taken off the market. Prices are generally lower with high prices in view. Quotations follows:

(Prices to Consumers)

Auto tire peelings	ton	17.00	@18.00
Mixed auto	ton	8.00	@ 9.00
Clean solid truck tires	ton	35.00	@37.50
Boots and shoes	ton	19.00	@20.00
Arctics, untrimmed	ton	15.00	@16.00
Inner tubes, No. 1	lb.	.06 @	.06¼
Inner tubes, No. 2	lb.	.03½ @	.03¾
Inner tubes, Red	lb.	.02⅜ @	.02½

Cotton

After a steady rise during July to 13.15 cents for spot middling, with an average price for the month of 12.84 cents, cotton jumped to 13.75 yesterday, largely as a result of the government crop estimate of 9,195,000 bales, the lowest since 1896 with the single exception of 1921. The government estimate was even smaller than operators had expected and prices rose nearly $2.50 a bale, ending with gains of 43 to 47 points. The market had made little progress recently due to the expectancy of rain in the drought areas but with the low government estimate and the large amount of bidding on government contracts for cotton goods for relief purposes, mills have begun to fix prices on raw materials, thereby reducing the floating supply of contracts. Quotations on the N. Y. Cotton Exchange for Middling Uplands follow:

	July 10	August 8		
	Close	High	Low	Close
Oct.	12.63	13.68	13.21	13.63
Dec.	12.78	13.84	13.36	13.78
March	12.93	14.00	13.53	13.94

Tire Fabrics

(Prices Net at the Mill—Process Tax Included)

Peeler, carded, 23/5/3	lb.	.41½ @	—
Peeler, carded, 23/4/3	lb.	.42 @	—
Peeler, carded, 15/3/3	lb.	.39½ @	—
Peeler, carded, 13/3/3	lb.	.38½ @	—
Egyptian, carded, 23/5/3	lb.	.51¼ @	—
Egyptian, combed, 23/5/3	lb.	.56¼ @	—

CHAFERS

Carded, American, 1 1/16"	lb.	.41 @	.42
Carded, American, 1"	lb.	.32½ @	.34½

LENO BREAKER

Carded, American, 1 1/16"	lb.	.41 @	.42
Carded, American, 1"	lb.	.32½ @	.34½

Sheetings

Count	Width	Weight			
48x40	36 in.	5.50	lb.	— @	.05⅝
40x40	36 in.	6.15	lb.	— @	.05⅝
40x36	36 in.	6.50	lb.	— @	.05
48x48	40 in.	2.50	lb.	— @	.11¼
48x48	40 in.	2.85	lb.	— @	.10⅛
64x68	40 in.	3.15	lb.	— @	.11
56x60	40 in.	3.60	lb.	— @	.09⅛
48x44	40 in.	3.75	lb.	— @	.08⅜
44x40	40 in.	4.25	lb.	— @	.07

Ducks

Enameling	lb.	.32 @	.37½
Belting and Hose	lb.	.34 @	—
Single filling, A grade	lb.	.16¾ @	.17¼
Double filling	lb.	.17¾ @	.18¼

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM JULY 11 TO AUGUST 8

Date		Spot	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Sales
July	11	14.85	14.86	14.96	15.11	15.23	15.36	15.49	15.61	15.73	15.83	15.97	16.12	16.25	——	338
	12	14.60	14.64	14.74	14.84	14.97	15.10	15.23	15.35	15.46	15.58	15.71	15.85	15.97	——	726
	13	14.64	14.60	14.72	14.84	14.97	15.09	15.22	15.34	15.45	15.58	15.71	15.85	15.97	——	510
	14	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	15	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	16	14.60	14.55	14.69	14.82	14.94	15.06	15.18	15.31	15.42	15.54	15.67	15.80	15.93	——	308
	17	14.45	14.41	14.54	14.67	14.79	14.92	15.05	15.14	15.26	15.38	15.51	15.65	15.79	——	410
	18	14.75	14.70	14.82	14.94	15.07	15.20	15.33	15.45	15.56	15.68	15.81	15.94	16.07	——	449
	19	14.80	14.76	14.88	15.01	15.13	15.26	15.39	15.55	15.64	15.74	15.87	16.01	16.14	——	539
	20	14.64	14.59	14.71	14.83	14.95	15.08	15.22	15.30	15.43	15.59	15.72	15.86	15.99	——	429
	21	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	22	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	23	14.60	14.57	14.68	14.80	14.93	15.04	15.15	15.29	15.42	15.57	15.71	15.85	15.99	——	229
	24	14.60	14.49	14.60	14.72	14.85	14.98	15.11	15.25	15.35	15.46	16.60	15.74	15.88	——	279
	25	14.56	14.50	14.61	14.73	14.85	14.96	15.07	15.21	15.31	15.42	15.57	15.72	15.85	——	371
	26	14.25	14.21	14.24	14.27	14.41	14.54	14.67	14.77	14.88	15.00	15.13	15.26	15.39	——	788
	27	14.37	14.30	14.33	14.43	14.57	14.69	14.82	14.93	15.04	15.16	15.28	15.41	15.50	——	441
	28	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	29	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	30	14.55	14.52	14.55	14.65	14.79	14.91	15.03	15.15	15.26	15.38	15.51	15.65	15.78	——	291
	31	14.62	——	14.60	14.70	14.83	14.95	15.09	15.22	15.34	15.46	15.58	15.70	15.82	——	184
Aug.	1	14.68	——	14.64	14.75	14.88	15.01	15.14	15.26	15.37	15.48	15.61	15.74	15.89	16.04	344
	2	14.87	——	14.85	14.95	15.08	15.21	15.34	15.46	15.57	15.69	15.81	15.94	16.08	16.22	449
	3	15.00	——	15.00	15.09	15.22	15.35	15.48	15.61	15.73	15.85	15.95	16.06	16.22	16.38	503
	4	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	5	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
	6	15.32	——	15.32	15.43	15.56	15.69	15.83	15.96	16.06	16.16	16.27	16.39	16.54	16.69	745
	7	15.45	——	15.45	15.53	15.63	15.79	15.95	16.08	16.20	16.32	16.46	16.60	16.73	16.87	1080
	8	15.45	——	15.45	15.55	15.69	15.82	15.95	16.08	16.20	16.33	16.46	16.59	16.71	16.85	608

Rubber CHEMICAL Markets

NEW YORK, AUGUST 9, 1934

[All Quotations F.O.B. Works Unless Otherwise Noted]

ACCELERATORS

Organic			
A-1	lb.	.21 @	.25
A-5-10	lb.	.33 @	.36
A-7	lb.	.53 @	.65
A-11	lb.	.60 @	.75
A-16	lb.	.55 @	.65
A-19	lb.	.56 @	.75
A-32	lb.	.70 @	.80
Aldehyde ammonia, crystals	lb.	.65 @	.67
Altax	lb.		
Captax	lb.		
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.46 @	.47
Diphenylguanidine	lb.	.36 @	.37
Ethylidene aniline	lb.	.45 @	.47½
Formaldenyde aniline	lb.	.37½ @	.42
Guantal	lb.	.42 @	.51
Heptene	lb.	.40 @	—
Hexamethylene-tetramine	lb.	.37 @	—
Lead Oleate, No. 999	lb.	.10 @	—
Witco	lb.	.10 @	—
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.36 @	.37
Monex	lb.	3.25 @	—
Oxynone	lb.	.68 @	.80
Phenex	lb.	.50 @	.55
Pipsol X	lb.	3.55 @	4.00
R & H 40	lb.	.40 @	.41
R & H 50	lb.	.40 @	.41
R-2	lb.	1.55 @	1.90
R-2 Base	lb.	4.55 @	5.00
Safex	lb.	1.20 @	1.25
SPDX	lb.	.75 @	—
Super-Sulphur No. 1	lb.		
No. 2	lb.		
Thiocarbanilid, drums	lb.	.20 @	.23
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.58 @	.60
Tuads	lb.		
Ureka	lb.	.62 @	1.00
Ureka C	lb.	.58 @	.69
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Z-88-P	lb.	.48 @	.60
Zimate	lb.		
Inorganic			
Litharge, domestic	lb.	.06¾ @	—
Magnesia, calcined, heavy	cwt.	4.00 @	4.50

COLORS

Blacks (See Compounding Materials)

Blues			
Prussian	lb.	.36 @	.38
Ultramarine	lb.	.07 @	.10
Browns			
Sienna, Italian	lb.	.06 @	'13
Umber, Turkey	lb	.04 @	.04½
Greens			
Chrome, light	lb.	.23 @	.26
medium	lb.	.24 @	.27
dark	lb.	.27 @	.30
Chromium Oxide, bbl.	lb.	.23 @	.27
Reds			
Antimony crimson, 15/7	lb.	.45 @	—
sulfur, free	lb.	.48 @	.52
Indian English	lb.	.09 @	.10
Domestic (Maroon)	lb.	.11 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼ @	—
Whites			
Cryptone CB, No. 21	lb.	.06 @	.06¼
Cryptone, No. 19	lb.	.06 @	.06¼
Lithopone			
Albalith, black label—11	lb.	.04½ @	.04¾
Azolith	lb.	.04½ @	.04¾
Rayox	lb.		
Titanium oxide	lb.	.17 @	.19
Titanox B	lb.	.06 @	.06½
Titanox C	lb.	.06 @	.06½
XX—20 Zinc Sulphide, bbls.	lb.	.11 @	.11¼
XX—86 Zinc Sulphide, bbls.	lb.	.11 @	.11¼
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06½ @	.06¾
ZZ (leaded)	lb.	.06¼ @	.06½
Horsehead Lead Free Brand:			
Special—3	lb.	.06½ @	.06¾
XX Red—4	lb.	.06½ @	.06¾
XX Red—72	lb.	.06½ @	.06¾
XX Red—78	lb.	.06½ @	.06¾
XX Red—103	lb.	.06½ @	.06¾
U. S. P.—X, bbls.	lb.	.12½ @	.12¾
Kadox, black label—15	lb.	.09⅜ @	.09⅝
Blue label—16	lb.	.08⅜ @	.08⅝
Red label—17	lb.	.07 @	.07¼
St. Joe, black label	lb.	.06½ @	.06¾
green label	lb.	.06½ @	.06¾
red label	lb.	.06½ @	.06¾
Zinc Oxide—French Process			
Anaconda, lead free	lb.	.06½ @	.06¾
Anaconda, selected lead free	lb.	.06¼ @	.07
Florence White seal—7 bbls.	lb.	— @	.10⅜
Green seal—8	lb.	.09⅜ @	.09⅝
Red seal—9	lb.	.08⅜ @	.08⅝
Yellows			
Chrome	lb.	.15 @	.16
Ocher, dom. med.	lb.	.01½ @	.02

BLACKS

Arrow "Aerfloted" Specification	lb.	.0535 @	.0825
Bone, powdered	lb.	.05½ @	.12½
Carbon, compressed	lb.	.0535 @	.0825
uncompressed	lb.	.0535 @	.0825
"Certified," Cabot	lb.	.0535 @	.0825
Spherons	lb.	.0535 @	.0825
"Disperso"	lb.	.0535 @	.0825
Drop, bbls.	lb.	.05½ @	.14
"Excello," compressed	lb.	.0535 @	.0825
"Fumonex"	lb.	.03 @	.07
"Gastex"	lb.	.03 @	.07
Lampblack	lb.	.06 @	.08
"Micronex"	lb.	.0535 @	.0825
"Supreme"	lb.	.0535 @	.0825
Thermatomic—"P 33"	lb.	— @	—
"Thermax"	lb.	— @	—
United "Dixie" & "Kosmos"	lb.	.0535 @	.0825

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85	@24.50
Ammonia carbonate, lump	lb.	.10½ @	.12
Asbestine	ton	14.00	@15.00
Barium carbonate (98-100%)	ton	56.50	@61.50
Barium Dust	lb.	.05 @	.06
Barytes southern off-color	ton	10.00	@18.00
Western prime white	ton	23.00	@30.00
Basofor	lb.	.04½ @	—
Bentonite	lb.	.02 @	.03
Blanc fixe dry f.o.b. works	ton	42.50	@75.00
Calcene	ton	35.00	@45.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	60.00	@75.00
heavy	ton	45.00	@55.00
Clay, Kaolin, domestic	ton	7.50	@15.00
Aerfloted, Suprex	ton	7.50	@10.00
Congaree	ton	9.00 @	—
Dark Blue Ridge	ton		
Dixie	ton		
Lexington	ton	10.00	@22.00
McNamee	ton		
Par	ton		
Tensulite		15.00 @	—
Cotton Flock	lb.	.10½ @	.18
Glues, extra white	lb.	.20 @	.30
medium white	lb.	.14 @	.19
Kalite No. 1	ton	30.00	@55.00
Kalite No. 3	ton	40.00	@65.00
Magnesia, carbonate	lb.	.06 @	.06¾
Mica	lb.	.04 @	—
Rottenstone (powdered)	lb.	.02½ @	.05
Soapstone, powdered	ton	16.00	@22.00
Starch, powdered	cwt.	2.81	@ 3.01
Talc, domestic	ton	12.00	@15.00
Pyrax A	ton		
Whiting, commercial	ton	17.00	@18.00
English Cliffstone	ton	33.00	@43.00
Sussex	ton		
Witco	ton	20.00	@50.00
Wood Flour	ton	25.00 @	—
Zinc Carbonate	lb.	.10½ @	—
Zinc Stearate	lb.	.23 @	—

MINERAL RUBBER

Genasco (factory)	ton	25.00	@27.00
Hard Hydrocarbon	ton		
Parmr, solid	ton	21.00	@26.00
Pioneer, MR, solid	ton		
Pioneer-granulated	ton		

SPECIALTIES

Aromatics—Rodo	lb.		
Para-Dors No. 5145	lb.	2.00 @	—
Sunproof	lb.	.35 @	.37½
Sponge Paste	lb.	— @	.80
Tonox	lb.	.56 @	.60

SOFTENERS

Acids			
Nitric, 36 degrees	cwt.	5.00 @	5.25
Sulfuric, 66 degrees	cwt.	1.60 @	1.90
Tartaric, crystals	lb	.26 @	—
Acids, Fatty			
Laurex	lb.	.15 @	.16
Stearex	lb.	.08 @	.12
Stearic, double pressed	lb.	.08 @	.12
Alkalies			
Caustic Soda, 76%	cwt.	3.60 @	—
Soda Ash, 58% C.L.	cwt.	2.52 @	—
Oils			
Corn, refined, bbls	lb	.06¾ @	.07¼
Cottonseed, crude	gal.	— @	.04
Cycline Oil	gal.	.15 @	.28
Degras (c.l. 100 bbls.)	lb.	.02¼ @	—
Less c.l. (10-25 bbls.)	lb.	.03 @	—
Lots less than 10 bbls.	lb.	.03¼ @	—
Fluxrite	lb.	.05½ @	.06½
Palm Lagos	lb.	.03¾ @	.04
Niger	lb.	.03⅜ @	.03½
Para-Flux	gal.	.17 @	—
Petrolatum, light	lb.	.02½ @	—
Pigmentaroil, tank cars	gal.	.14 @	—
in drums	gal.	.20 @	.21½
Pine, steam distilled	gal.	.59 @	.61
dest. dist., drums	gal.	.50 @	.53
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	.07½ @	—
Witco Softener (f.o.b. wks.)	lb.	.02 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Wobonite, c.l.	lb.	.05 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.05 @	.06
coal tar	gal.	.05½ @	.06
pine, 200 lb. gr. wt.	bbl.	6.00 @	—
Rosin, grade K, 280 lb.	bbl.	6.00 @	—
Pigmentar, tank cars	gal.	.14 @	—
in drums	gal.	.20 @	.21½
Tar Retort, drums	bbl.	12.50 @	—
Solvents			
Acetone, pure	lb.	.11 @	—
Alcohol, denatured, No. 1 bbls.	gal.	.43 @	—
Benzol, 90%	gal.	— @	.24
Bondogen	lb.	— @	—
Carbon, bisulfide	lb.	.05 @	.06
Carbon, tetrachloride	lb.	.06 @	—
Dichlorethylene	lb.	.29 @	—
Dipentene	gal.	.31 @	.41
Dryolene (f.o.b. Okla.)	gal.	.10 @	.10½
Ethylene dichloride	lb.	.05½ @	.06½
Gasoline, steel bbls.	gal.	.16 @	—
Naphtha, solvent	gal.	.26 @	.31
Plastogen	lb.		
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Turpentine, spirits	gal.	.55 @	—
wood	gal.	.50 @	—
dest. dist., drums	gal.	.43 @	.45
Waxes			
Beeswax, white	lb.	.34 @	.37
Carnauba	lb.	.20 @	.38
Ceresin, white	lb.	.10 @	.11
Montan, crude	lb.	.10 @	.11
Ozokerite, black	lb.	.24 @	.25
green	lb.	.26 @	.30
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.03⅝ @	—
White crude scale 124/126	lb.	.03¾ @	—
Refined, 123/127, 138/140	lb.	.04¾ @	—

ANTI-OXIDANTS

AgeRite, Gel	lb.		
Powder	lb.		
Resin	lb.		
White	lb.		
Albasan	lb.	.70 @	.75
Antox	lb.		
B-L-E	lb.	.57 @	.60
Flectol-A and Flectol-B	lb.	.54 @	.62
Neozone	lb.		
Oxynone	lb.	.66 @	.90
Resistox	lb.	.52 @	.65
Retardex	lb.	.35 @	.40
Stabilite	lb.	.57 @	.62
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.55 @	.60

MOLD LUBRICANTS

Dipex	lb.	.06 @	.08
Rusco, f.o.b. Nitro	lb.	.12 @	.30
Sericite, f.o.b. N. Y.	ton	65.00 @	—
Soap Tree Bark, cut, sifted	lb.	.06 @	.08
Zip	lb.	— @	—

SUBSTITUTES (FACTICE)

Amberex	lb.	.13¾ @	—
Black	lb.	.08½ @	—
White	lb.	.08 @	.12
Brown	lb.	.07 @	.11½

VULCANIZING INGREDIENTS

Sulfur Chloride (drums)	lb.	.03½ @	.04½
Sulfur flour,			
Refined, 100% pure (bage)	cwt.	2.50 @	3.40
Commercial (bags)	cwt.	1.55 @	2.50
Telloy	lb.		
Vandex	lb.		

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,144	185,060,304	26.72	8,772	5,672,319	28.87	300,372
1924	328,056	174,231,331	23.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	22,470,583	56.77	395,667
1927	426,258	339,874,774	35.60	27,775	24,735,488	39.76	398,483
1928	439,731	244,854,973	25.03	32,159	18,128,361	25.17	407,572
1929	560,084	239,178,783	19.15	36,485	16,868,733	20.64	523,599
1930	482,082	139,134,330	12.89	30,205	9,316,205	13.77	451,877
1931	497,138	72,918,949	6.54	25,595	4,255,472	7.42	471,543
1932	409,584	31,936,459	3.47	20,929	2,015,612	4.30	388,655
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	427,280
1932:							
May	34,182	2,798,914	3.71	1,505	144,561	4.30	32,677
June	40,808	2,647,085	2.89	1,981	134,336	3.02	39,136
July	32,306	2,102,915	2.91	2,030	179,699	3.95	30,276
August	33,449	2,027,045	2.71	1,339	128,952	4.29	32,110
Sept.	28,956	1,774,403	2.73	2,388	241,960	4.54	26,568
Oct.	35,096	2,436,522	3.10	1,059	98,022	4.13	34,037
Nov.	28,908	2,263,469	3.48	1,745	158,618	4.06	27,163
Dec.	31,384	2,360,061	3.34	770	66,165	3.98	30,614
1933:							
Jan.	29,822	2,213,828	3.03	1,403	109,916	3.49	28,419
Feb.	22,603	1,554,086	3.12	1,244	102,129	3.73	21,359
Mar.	27,936	1,867,657	2.98	1,127	86,216	3.42	26,809
April	20,240	1,291,136	2.85	798	70,111	3.92	19,442
May	26,002	1,694,963	2.93	1,842	189,451	4.59	24,894
June	22,900	1,780,495	3.47	1,276	156,168	5.46	21,624
July	44,625	4,293,111	4.29	1,419	219,945	6.92	43,206
August	44,257	5,391,709	5.44	2,205	302,132	6.12	42,052
Sept.	44,912	6,110,956	6.07	2,369	335,798	8.89	42,543
Oct.	44,474	6,115,330	6.14	2,669	397,167	6.64	41,805
Nov.	40,582	5,850,714	6.44	2,188	333,631	6.81	38,394
Dec.	39,461	5,869,556	6.75	1,888	293,690	6.94	37,573
1934:							
Jan.	47,963	7,403,123	6.89	1,975	352,116	7.96	45,988
Feb.	34,335	5,262,711	6.84	2,133	476,232	9.97	32,202
Mar.	41,119	6,765,173	7.34	2,947	583,313	8.83	38,172
April	43,841	8,232,746	8.37	2,814	588,453	9.18	41,027
May	48,494	10,001,239	9.21	2,389	544,212	10.17	46,105
June	49,632	11,168,781	10.22	2,010	501,529	11.34	47,622

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule: Tons	Guayule: Dollars	Balata: Tons	Balata: Dollars	Jelutong: Tons	Jelutong: Dollars	Liquid Latex (1): Tons	Liquid Latex (1): Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,853	3,537,810
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,388	4,680,386
1927	5,018	2,674,957	582	447,246	7,785	2,448,657	1,116	876,677
1928	3,075	1,755,685	731	430,855	7,552	2,540,059	4,167	2,185,579
1929	1,231	545,175	728	566,964	8,203	2,458,136	3,728	1,787,997
1930	1,096	347,388	501	422,684	5,907	1,403,244	4,449	1,506,804
1931	—	—	1,208	411,692	5,777	1,019,010	4,650	884,355
1932	—	—	708	147,403	4,607	616,596	5,085	601,999
1933	—	—	1,658	2,261,869	5,989	944,895	11,085	1,833,671
1933:								
May	—	—	35	9,869	463	55,560	734	71,008
June	—	—	759	1,514,296	466	61,229	604	66,827
July	—	—	238	76,141	638	79,049	618	85,636
Aug.	—	—	272	527,147	390	55,509	1,156	196,138
Sept.	—	—	65	30,738	761	149,296	1,343	267,516
Oct.	—	—	119	47,663	542	99,249	1,561	310,531
Nov.	—	—	31	11,252	626	125,160	1,239	282,065
Dec.	—	—	42	20,008	708	143,868	1,299	270,533
1934:								
Jan.	—	—	98	43,932	766	169,966	1,126	239,054
Feb.	—	—	68	36,346	453	102,471	885	193,732
Mar.	51	9,464	145	51,080	25	43,532	1,134	257,545
April	100	18,928	128	50,965	533	98,658	1,334	321,390
May	100	18,928	143	65,471	538	95,710	1,407	368,642
June	—	—	83	49,881	388	71,672	1,458	421,317

(1) Weight given in pounds of dry rubber contained in latex.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

Figures on Monthly Basis

	1927	1928	1929	1930	1931	1932	1933	1934
Jan.	31,518	34,403	43,002	36,194	28,557	29,648	21,661	40,413
Feb.	30,137	33,702	41,594	33,302	28,797	31,821	21,638	40,609
Mar.	36,141	35,688	44,730	35,540	32,788	29,505	18,047	47,097
Apr.	35,871	32,772	47,521	39,686	33,321	27,315	25,928	44,947
May	34,592	37,333	49,233	39,386	37,817	30,957	44,074	43,012
June	33,801	37,676	43,227	34,195	37,916	41,475	50,743*	40,242
July	29,219	37,407	41,526	29,508	31,397	29,976	50,184	.....
Aug.	33,460	42,927	38,274	30,850	27,586	23,721	44,939	.....
Sept.	27,214	39,882	34,707	25,515	23,638	23,847	35,686	.....
Oct.	26,790	40,857	34,800	27,516	22,277	22,286	31,906	.....
Nov.	26,792	37,461	27,659	23,691	22,943	23,231	29,162	.....
Dec.	25,492	31,232	25,531	21,687	21,409	18,015	29,087	.....
Tot.	371,027	441,340	469,804	375,980	348,986	332,000	405,689	.....

* Revised.

Figures on Quarterly Basis

Quarter	1926	1927	1928	1929	1930	1931	1932	1933
Jan./Mar.	94,301	99,216	103,558	128,565	101,610	89,652	85,309	64,326
Apr./June	87,109	103,242	103,500	139,292	112,229	107,755	92,643	125,126
July/Sept.	93,793	89,210	117,573	113,746	85,261	83,632	72,523	132,406
Oct./Dec.	83,212	80,860	117,597	84,872	72,020	65,645	64,145	94,198
Totals	358,415	372,528	442,227	466,475	371,120	346,684	314,620	416,056

Note—The quarterly figures are generally regarded as the most authentic; the monthly figures may be accepted as preliminary.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks*	Year	Production	Consumption: Tons	Consumption: % to Crude	Stocks*
1923	74,766	69,534	22.7	.....	1928	208,516	223,000	50.4	24,785
1924	80,079	76,072	22.4	.....	1929	218,954	226,588	48.4	27,464
1925	132,930	137,105	35.6	13,203	1930	157,967	153,497	40.8	22,000
1926	180,582	164,500	45.9	23,213	1931	133,351	124,126	33.9	19,257
1927	189,144	178,471	47.6	24,980	1932	75,608	77,504	23.4	16,354
1933:									
Jan.	5,301	4,811	21.0	16,262	July	12,049	10,317	20.6	14,108
Feb.	4,578	4,363	20.2	16,570	Aug.	11,708	9,446	21.0	15,037
Mar.	3,847	3,454	19.1	15,496	Sept.	10,435	7,862	22.0	15,869
Apr.	4,617	4,407	13.1	14,370	Oct.	9,466	7,212	22.6	17,748
May	8,366	7,770	17.4	13,734	Nov.	9,063	6,335	21.7	19,170
June	10,591	9,674	19.1	13,231	Dec.	9,539	5,951	20.5	20,746
1934:									
Jan.	9,828	7,000	17.3	24,263	July	....	....	...	....
Feb.	9,504	7,646	18.8	23,356	Aug.	....	....	...	....
Mar.	11,479	9,683	20.6	25,113	Sept.	....	....	...	....
Apr.	10,185	9,387	20.9	22,033	Oct.	....	....	...	....
May	10,848	9,500	22.1	22,887	Nov.	....	....	...	....
June	10,820	9,459	23.5	23,664	Dec.	....	....	...	....

* Stocks on hand at the end of month or year.
(Rubber Manufacturers' Association figures raised to 100%)

U. S. Consumption of Gasoline

(In Thousands of Barrels of 42 Gallons)

	1932	1933	1934		1932	1933	1934
January	26,038	26,510	29,416	August	35,706	37,426	.....
February ...	25,378	23,312	25,048	September ..	33,828	34,303	.....
March	29,597	28,227	30,528	October	32,680	32,973	.....
April	31,234	30,176	32,735	November ..	29,895	30,262	.....
May	32,016	33,999	38,141	December ..	27,110	28,787	.....
June	39,489	37,710	36,296				
July	30,929	34,458	.....	Total	373,900	378,143	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1932																																
March	3 1/16	3 1/16	3 1/2	3 5/16	3 1/16	—	3 5/16	3 1/16	3 1/16	3 5/16	3 5/16	3 5/16	—	3 5/16	3 5/16	3	3 1/16	3 1/4	3 5/16	—	—	3	3 1/16	3 1/16	3 5/16	3 1/16	—	3 1/16	3 5/16	—	3 1/16	3 1/16
April	3	3	3	3	3 1/16	3	2 15/16	3	3	3	3	3 1/16	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
May	3	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16
June	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16
July	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16
August	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	2 15/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16
September	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16	4 1/16
October	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16
November	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16
December	3 1/16	3 1/16	3 1/16	—	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16
1933																																
January	—	2 1/8	3 1/16	3 1/16	3 1/16	3 1/16	2 1/8	—	—	3 1/16	3 1/16	3 1/16	—	3 1/16	3 1/16	2 1/8	3	2 1/8	2 1/8	3	3 1/16	2 1/8	3	2 1/8	2 1/8	3 1/16	3 1/16	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	3
February	2 1/8	2 1/8	3	2 1/8	2 1/8	3	2 1/8	2 1/8	2 1/8	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
March	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16
April	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16	4 3/16
May	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16	5 5/16
June	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16	6 5/16
July	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16
August	7 5/16	7 5/16	8	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16	7 5/16
September	7 5/16	7 5/16	8	8	8 1/16	7 15/16	8	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16
October	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16
November	7 1/16	7 1/16	8	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16	8 1/16
December	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16
1934																																
January	—	9	8 1/16	9	9	—	—	—	8 3/16	8 3/16	8 3/16	8 3/16	8 3/16	—	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	9 1/16	10 3/16	10	10	9 3/16
February	9 1/16	10 1/2	9 1/16	—	10 1/16	10 5/16	10 3/16	10 1/16	10 1/16	10 1/16	11 1/16	11 1/16	11 1/16	11 1/16	10 1/16	10 1/16	10 1/16	10 1/16	10 1/16	10 1/16	10 1/16	10 1/16	10 1/16	10 1/16	10 1/16	10 1/16	10 1/16	10 1/16	—	—	—	10 1/2
March	10 1/2	11 1/16	11 1/16	11 1/16	11 1/16	11 5/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	—	—	—	11
April	11 1/16	11 1/16	11 1/16	11 1/16	11 5/16	11 5/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	11 1/16	12	12 1/16	11 1/16	11 1/16	11 1/16	11 1/16	12	12 1/16	12 1/16	12 1/16	12 1/16	12 1/16	12 1/16	12 1/16	12 1/16	12 1/16	—	—	—	12 1/16
May	14 1/16	14 1/16	15	12 3/16	13 5/16	13 5/16	13 1/16	13 1/16	13 1/16	13 1/16	13 5/16	13 5/16	13 5/16	13 5/16	13 1/16	13 1/2	13 1/16	13 1/16	13 1/16	13 1/16	13 1/16	13 1/16	13 1/16	13 1/16	13 1/16	13 1/16	13 1/16	13 1/16	13 5/16	12 3/4	13 3/4	13 1/2
June	13	14	14 3/16	—	—	—	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	13 7/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 3/16	14 1/8	14 1/8	14 3/8
July	14 7/16	14 7/16	15	—	—	—	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16	15 7/16
August	14 7/16	14 1/8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1929

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15	1922	17.50	1926	48.50
1911	141.30	1915	65.85	1919	48.70	1923	29.45	1927	37.72
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.55

Average Monthly Price per Pound Since 1928

Month	1928 Cents	1929 Cents	1930 Cents	1931 Cents	1932 Cents	1933 Cents	1934 Cents
Jan.	40.25	20.14	15.24	8.34	4.38	3.08	9.32
Feb.	32.75	23.97	15.85	7.70	4.03	2.95	10.45
Mar.	26.82	24.55	15.34	7.71	3.35	3.01	11.01
Apr.	18.97	21.18	14.93	6.43	3.02	3.56	12.10
May	18.99	21.46	14.24	6.49	3.09	4.95	13.26
June	19.59	20.64	12.45	6.35	2.66	6.15	13.51
July	19.40	21.30	11.24	6.37	2.89	8.01	14.60
Aug.	19.46	20.59	9.96	5.38	3.63	7.31	....
Sept.	18.47	20.37	8.28	5.08	3.84	7.30	....
Oct.	18.83	19.67	8.20	4.87	3.65	7.64	....
Nov.	18.26	16.62	9.01	4.65	3.44	8.66	....
Dec.	17.97	16.12	9.05	4.64	3.24	8.87	....
Average for Year	22.48	20.55	11.98	6.17	3.49	5.96	....

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	May	June	July	Aug.	Day	May	June	July	Aug.
1	6 1/4	6 1/4	—	7 1/8	17	6 1/16	—	7	
2	6 7/8	6 1/4	6 3/4	7 1/8	18	6 7/8	6 7/8	7 1/8	
3	6 7/8	—	6 15/16	7 1/8	19	—	6 1/2	7 1/8	
4	7 1/16	6 1/8	7 1/16	—	20	—	6 3/8	7 1/8	
5	7 1/4	6 7/16	7 1/8	—	21	—	6 7/16	7 1/8	
6	—	6 7/16	7 1/16	—	22	6 7/16	6 7/16	—	
7	7 1/8	6 7/16	7	7 1/16	23	5 15/16	—	7 1/8	
8	7 3/8	6 1/2	—	7 3/16	24	5 15/16	—	7 1/16	
9	6 5/8	6 1/2	7		25	5 7/8	6 5/8	7	
10	6 1/8	—	7 1/8		26	5 15/16	6 1/4	6 15/16	
11	6 7/16	6 3/16	7 1/16		27	—	6 3/4	7	
12	6 1/16	6 1/16	7 1/8		28	5 15/16	6 3/4	7	
13	—	6 3/8	7		29	5 15/16	6 7/8	—	
14	5 15/16	6 1/2	7 1/16		30	5 3/4	6 15/16	7 1/16	
15	6 7/16	6 7/16	—		31	5 15/16	—	7 1/16	
16	6 1/16	6 1/16	7						

Average Monthly Price Per Pound

Month	1931 Pence	1932 Pence	1933 Pence	1934 Pence
Jan.	4.160	3.052	2.264	4.429
Feb. ...	3.823	2.760	2.093	4.920
Mar. ...	3.822	2.047	2.099	5.136
Apr. ...	3.082	1.876	2.323	5.712
May ...	3.035	1.825	2.966	6.207
June ...	3.082	1.750	3.392	6.245
July ...	3.048	1.875	3.860	7.053

Month	1931 Pence	1932 Pence	1933 Pence	1934 Pence
Aug ...	3.385	2.654	3.811	
Sept. ..	2.524	2.485	3.728	
Oct. ...	2.898	2.425	3.957	
Nov. ..	2.890	2.518	4.096	
Dec. ..	3.115	2.444	4.200	
Average for Year ...	3.155	2.434	3.233	

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	June	July	Aug.	Date	June	July	Aug.	Date	June	July	Aug.
1	11.80	—	13.20	11	12.15	13.00		21	12.20	—	
2	11.95	12.10	13.20	12	12.30	12.85		22	12.10	—	
3	—	12.30	13.10	13	12.30	13.15		23	12.15	13.10	
4	11.85	—	—	14	12.15	13.05		24	—	12.85	
5	12.10	12.30	—	15	12.15	—		25	12.35	12.85	
6	12.10	12.15	13.20	16	12.15	13.25		26	12.45	12.80	
7	12.20	12.10	13.30	17	—	13.30		27	12.35	12.95	
8	12.15	—	13.75	18	12.15	13.35		28	12.45	—	
9	12.25	12.45		19	12.35	13.25		29	12.35	—	
10	—	12.70		20	12.20	13.00		30	12.45	13.20	
								31	—	13.15	

Average Monthly Price Per Pound

	1931 Cents	1932 Cents	1933 Cents	1934 Cents
Jan.	10.27	6.65	6.23	11.25
Feb. ...	10.96	6.85	6.05	12.28
Mar. ...	10.90	6.86	6.39	12.30
Apr. ...	10.19	6.16	7.02	11.80
May ..	9.38	5.72	8.64	11.44
June ...	9.05	5.02	9.47	12.20
July ...	9.28	5.87	10.76	12.84

	1931 Cents	1932 Cents	1933 Cents	1934 Cents
Aug. ...	7.21	7.43	9.55	
Sept. ...	6.52	6.30	9.64	
Oct. ...	6.32	6.30	9.58	
Nov. ...	6.44	6.22	10.04	
Dec. ...	6.25	6.00	10.17	
Average for Year ...	8.56	6.41	8.63	

World Stocks of Crude Rubber

ON HAND OR AFLOAT TO THE U. S.

At End of	ON HAND 1932	ON HAND 1933	ON HAND 1934	AFLOAT 1932	AFLOAT 1933	AFLOAT 1934	ON HAND AND AFLOAT 1932	ON HAND AND AFLOAT 1933	ON HAND AND AFLOAT 1934
Jan.	322,860	396,376	368,660	42,234	32,539	45,768	365,094	428,915	414,428
Feb.	318,936	381,794	357,094	51,728	32,898	53,063	370,604	414,692	410,157
Mar.	329,586	390,135	353,242	44,190	29,531	54,722	373,776	419,666	405,786
Apr.	336,957	382,167	351,981	40,387	30,745	56,251	377,344	412,912	408,232
May	336,719	364,623	351,329	50,453	43,342	57,921	387,172	407,965	409,250
June	334,657	333,954	358,149	43,079	63,608	46,698	377,736	397,562	404,847
July	333,729	326,609		37,894	57,435		371,623	384,044	
Aug.	342,888	325,148		42,846	53,084		385,734	378,232	
Sept.	346,154	334,637		46,188	57,255		342,342	391,892	
Oct.	358,282	343,579		40,176	58,568		398,458	402,147	
Nov.	360,386	353,852		40,879	57,140		401,265	410,992	
Dec.	379,000	364,541		38,360	55,606		417,360	419,147	

(Rubber Manufacturers' Association figures raised to 100%)

STOCKS IN GREAT BRITAIN

Stocks in London

(No. of Tons in Wharves and Warehouses, including Latex)

At end of	1932	1933	1934	At end of	1932	1933	1934
Jan.	67,166	36,481	38,570	July	48,842	41,178	
Feb.	65,942	37,182	38,752	Aug.	47,079	39,480	
Mar.	64,280	40,689	40,501	Sept.	44,942	39,237	
Apr.	61,848	40,911	42,413	Oct.	42,327	37,101	
May	56,089	41,998	42,190	Nov.	40,606	36,139	
June	51,009	43,032	45,674	Dec.	37,407	35,615	

At End of Recent Weeks

	First Saturday	Second Saturday	Third Saturday	Fourth Saturday	Fifth Saturday
1934					
January	36,478	37,326	38,333	38,537	
February	39,064	39,509	40,133	39,775	
March	39,680	39,670	40,174	40,178	40,480
April	40,994	41,458	41,589	42,539	
May	41,815	42,908	41,900	42,118	
June	42,503	43,308	43,709	44,157	45,711
July	47,607	48,908	49,654	49,834	

Stocks in Liverpool

1934					
January	51,434	51,897	52,256	52,037	
February	51,937	52,615	52,920	52,944	
March	52,832	53,488	53,929	54,109	54,004
April	54,464	53,832	54,119	53,917	
May	53,915	54,268	54,123	54,276	
June	54,103	54,294	54,327	54,228	54,161
July	54,966	55,141	55,749	55,556	

STOCKS IN PENANG AND SINGAPORE

(Stocks held by Dealers—Quantities in Long Tons)

End of	1931	1932	1933	1934	End of	1931	1932	1933	1934
Jan.	48,802	48,850	22,525	40,405	July	51,203	17,017	36,972	
Feb.	49,283	46,954	21,530	41,884	Aug.	48,971	20,649	38,601	
Mar.	49,590	46,591	24,594	47,933	Sept.	47,025	20,415	36,948	
Apr.	45,868	39,663	25,460	48,431	Oct.	52,132	23,158	37,282	
May	44,278	38,690	29,822	76,393	Nov.	46,947	25,419	39,018	
June	47,517	19,770	34,676	73,218	Dec.	45,795	25,341	38,269	

STOCKS IN OTHER CENTRES

End of: 1933	Malaya Mainland	Afloat for Europe	Holland	Colombo	Para and Manaos
Apr.	33,391	27,710	2,214	3,428	5,204
May	32,613	24,090	1,534	3,177	4,790
June	35,919	22,930	1,147	2,913	4,321
July	35,020	22,900	1,007	3,208	3,830
Aug.	36,756	22,000	1,033	3,411	3,588
Sept.	36,083	25,900	1,107	4,286	3,288
Oct.	37,302	28,320	1,411	4,889	3,237
Nov.	36,965	38,530	1,285	5,575	3,383
Dec.	38,441	36,700	1,052	5,792	2,981
Jan., 1934	36,788	39,250	1,115	7,271	3,305
Feb.	39,630	36,563	906	5,366	3,420
Mar.	37,275	33,365	904	4,083	3,519
Apr.	33,765	32,640	905	4,070	3,624
May	7,213	40,000	897	3,066	3,556
June	20,243	40,000	....	....	....

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1924	21,863,311	1928	24,247,282	1932	6,261,336
1925	26,001,664	1929	24,141,502	1933	8,713,962
1926	24,199,524	1930	17,364,096	1934	.....
1927	19,700,003	1931	11,253,800	1935	.....
1934:		1934:		1934:	
January	789,274	May	1,140,132	September	.....
February	1,262,311	June	1,015,730	October	.....
March	1,651,548	July	1,155,024	November	.....
April	1,635,722	August	.....	December	.....

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1926	1927	1928	1929	1930	1931	1932	1933
Production	61,237	64,439	77,944	68,726	50,965	48,739	40,085	45,304
Shipments	59,002	64,059	74,296	69,395	53,638	48,151	40,260	44,094
Inventory[2]	10,456	10,264	13,624	11,838	9,003	7,775	7,644	8,888

Figures for Recent Months

	PRODUCTION 1932	PRODUCTION 1933	PRODUCTION 1934	SHIPMENTS 1932	SHIPMENTS 1933	SHIPMENTS 1934	INVENTORY 1932	INVENTORY 1933	INVENTORY 1934
Jan.	3,462	2,258	3,922	3,253	2,597	3,222	7,912	7,237	9,684
Feb.	3,871	2,339	4,335	2,553	2,292	3,285	9,172	7,377	10,725
Mar.	3,671	2,038	5,180	2,954	2,092	4,223	9,878	7,290	11,651
Apr.	3,517	3,123	4,470	3,698	3,654	4,438	9,846	6,778	11,981
May	3,820	5,189	4,456	4,258	5,180	5,332	9,379	6,760	11,127
June	5,643	6,100		10,065	6,305		4,999	6,615	
July	3,617	5,714		2,404	5,497		6,203	6,844	
Aug.	3,089	4,994		2,655	4,707		6,659	7,070	
Sept.	2,539	3,999		3,082	3,503		6,096	7,595	
Oct.	2,569	3,429		1,799	2,537		6,876	8,462	
Nov.	2,304	3,039		1,711	2,197		7,454	9,247	
Dec.	1,983	3,082		1,819	3,531		7,644	8,888	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1926	1927	1928	1929	1930	1931	1932	1933
Production	76,618	70,823	80,180	68,829	52,420	48,333	36,891	42,546
Shipments	71,591	72,896	77,127	70,592	54,938	50,021	37,911	41,391
Inventory[2]	16,200	13,692	16,117	12,807	9,999	7,922	6,749	7,815

Figures for Recent Months

	PRODUCTION 1932	PRODUCTION 1933	PRODUCTION 1934	SHIPMENTS 1932	SHIPMENTS 1933	SHIPMENTS 1934	INVENTORY 1932	INVENTORY 1933	INVENTORY 1934
Jan.	3,308	2,093	3,530	3,529	2,535	3,199	7,719	6,197	8,403
Feb.	3,281	2,224	4,077	2,728	2,102	3,323	8,760	6,357	8,445
Mar.	3,502	1,883	5,194	2,686	1,902	4,118	9,448	6,369	10,244
Apr.	3,225	2,853	4,735	3,385	3,051	4,342	9,441	6,189	10,585
May	3,820	5,189	4,456	4,258	5,180	5,332	9,379	6,760	11,127
June	5,279	5,448		9,019	5,778		5,174	6,097	
July	2,937	5,603		2,160	5,211		5,975	6,440	
Aug.	2,748	4,916		2,503	4,687		6,127	6,628	
Sept.	2,601	3,827		3,098	3,472		5,753	7,008	
Oct.	2,187	3,506		1,658	2,676		6,214	7,831	
Nov.	2,005	2,863		1,578	2,103		6,662	8,625	
Dec.	1,779	2,631		1,724	3,410		6,749	7,815	

(1) Rubber Manufacturers' Association figures, raised to 100%. The Association estimates its figures to be 75% complete up until 1929 and 80% complete for 1929-1933. Beginning 1934, the Association reported its figures to be 97% complete.

(2) Held by manufacturers at end of period indicated.

Automobile Production

	United States Total	United States Passenger Cars	United States Trucks	Canada Total	Canada Passenger Cars	Canada Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,927,256	1,586,338	340,918	65,924	53,855	12,069	1,993,180
1933*							
May	218,347	184,698	33,649	9,396	8,024	1,372	227,743
June	253,387	211,483	41,904	7,323	6,005	1,318	260,710
July	233,141	195,023	38,118	6,540	5,322	1,218	239,681
Aug.	236,556	195,144	41,412	6,079	4,919	1,160	242,635
Sept.	196,143	160,900	35,243	5,808	4,358	1,450	201,951
Oct.	138,542	108,073	30,469	3,682	2,723	959	142,224
Nov.	63,987	44,429	19,558	2,291	1,503	786	66,278
Dec.	84,152	53,900	30,252	3,262	2,171	1,091	87,414
1934							
Jan.*	156,907	113,652	43,255	6,904	4,946	1,958	153,811
Feb.*	231,707	187,666	44,041	8,571	7,101	1,470	240,278
Mar.*	331,263	274,738	56,625	14,180	12,272	1,908	345,443
Apr.*	354,745	289,031	65,714	18,363	15,451	2,912	373,108
May*	331,652	273,765	57,887	20,161	16,504	3,657	351,813
June	308,051	261,852	46,199	13,905	10,810	3,095	321,956

* Revised.

Exports of Crude Rubber from Principal Producing Countries

(*Long Tons*)

	BRITISH MALAYA [1]								DUTCH EAST INDIES [5]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon [2]	India & Burma [3]	Sarawak [4]	British North Borneo [3]	Siam [4]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China [3]	Amazon Valley	All Other [6]	World Total [7]
1923	252,816	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,562	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,296	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1932:															
Nov.	40,098	10,072	30,026	4,146	185	683	350	371	4,368	6,250	9,080	805	1,164	156	57,588
Dec.	40,118	10,089	30,029	5,801	367	644	350	406	4,683	7,066	8,594	1,211	824	150*	59,493
1933:															
Jan.	46,599	7,857	38,742	4,602	318	590	458	305	4,766	5,630	6,840	1,957	554	125*	58,887
Feb.	37,564	6,167	31,397	5,064	304	541	458	368	4,895	5,119	6,081	895	620	125*	55,867
Mar.	42,059	7,964	34,095	4,905	389	571	458	304	5,092	6,466	6,999	1,102	995	125*	61,501
Apr.	36,752	7,758	28,994	4,582	272	624	583	235	5,226	5,969	8,147	1,122	556	125*	56,435
May	42,902	13,664	29,238	4,643	475	1,091	583	359	6,782	7,298	13,195	1,371	918	125*	66,078
June	41,411	16,538	24,873	5,198	377	1,149	582	632	7,352	6,654	14,779	1,369	704	125*	63,794
July	50,531	18,772	31,759	4,201	270	1,358	728	797	7,367	8,580	16,534	1,310	913	125*	73,942
Aug.	52,266	17,869	34,397	5,839	246	955	728	926	6,460	7,985	15,161	808	1,116	125*	74,746
Sept.	49,607	15,146	34,461	5,111	125	1,027	728	611	5,868	9,164	15,005	1,702	656	125*	74,452
Oct.	61,002	17,390	43,612	5,674	271	959	750*	979	6,329	8,692	15,170	1,513	965	125*	84,879
Nov.	54,599	20,142	34,457	6,097	516	1,020	750*	1,191	6,684	9,951	14,474	1,599	956	125*	77,820
Dec.	57,579	18,110	39,469	7,062	964	989	750*	1,046	7,030	10,183	17,274	2,173	930	125*	87,995
1934:															
Jan.	55,055	21,184	33,871	7,551	1,531	1,197	750*	1,290	6,513	8,974	17,718	2,158	576	125*	82,254
Feb.	57,867	19,688	38,179	8,354	775	1,005	750*	1,264	6,706	10,277	17,466	1,100	831	125*	86,832
Mar.	58,515	26,470	32,045	6,954	1,412	1,360	750*	1,363	8,655	12,043	25,064	1,316	846	125*	91,933
Apr.	56,748	27,963	28,785	5,783	762	1,447	750*	1,311	7,282	11,324	24,054	1,519	440	125*	83,582
May	69,403	34,093	35,310	7,528	1,106	1,892	750*	997	12,104	16,720	34,710	1,408	726	125*	113,376
June	53,282	20,981	32,301	3,305	.....	1,886	750*	1,497	4,860	6,078	15,216	1,504	.....	.....	.....
July	53,335	22,829	30,506	4,093	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927, 1,437 in 1928, 2,670 in 1929, and 1,274 in 1930. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons in 1924, 6 tons in 1925, 20 tons in 1926, about ½ ton in 1927, and 1 ton in 1928, and practically none in 1929, 1930 and 1931. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons in 1924, 2,239 tons in 1925, 44 tons in 1926, 84 tons in 1927, 1,459 tons in 1928, 1,302 tons in 1929, and 2,656 tons in 1930. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands, and includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. * Figure is provisional; final figure will be shown when available.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,496	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	.....
1933:															
Mar.	27,348	8,883	6,093	4,425	1,114	6,035	1,604	2,088	1,904	952	282	649	340	688	62,405
Apr.	20,236	7,765	6,308	4,805	555	5,495	2,207	2,274	1,580	882	163	606	281	400	53,565
May	24,894	11,085	4,144	4,622	1,704	5,289	1,278	1,691	425	710	—525	536	433	432	56,718
June	22,228	8,739	4,056	3,639	1,441	3,330	1,997	2,000	613	469	—519	772	541	400	49,706
July	43,824	3,961	3,774	4,103	1,192	1,460	1,146	2,952	2,347	299	16	486	435	287	66,282
Aug.	43,208	4,330	5,251	4,193	1,795	4,424	1,249	3,312	1,500	325	209	616	606	2,759	73,779
Sept.	43,886	4,341	4,111	5,841	2,620	5,369	2,055	2,168	794	864	189	604	790	577	74,211
Oct.	43,366	3,373	4,921	4,772	2,580	6,150	1,836	2,084	604	1,118	310	777	441	686	73,081
Nov.	39,633	3,955	5,419	4,086	2,184	6,296	942	4,483	301	1,129	222	878	493	882	70,903
Dec.	38,864	6,524	5,415	4,933	1,773	6,865	1,029	2,400	190	1,360	213	703	776	1,772	72,817
1934:															
Jan.	47,114	9,503	6,843	6,057	1,721	5,628	2,517	2,749	566	2,173	381	1,185	484	1,355	88,276
Feb.	33,087	10,785	7,376	5,490	1,854	4,570	2,388	3,399	950	1,538	287	464	656	516	73,357
Mar.	39,306	14,008	7,871	6,453	3,411	5,655	1,394	4,018	671	965	284	836	394	976	86,242
Apr.	42,262	9,999	8,192	6,701	2,419	5,679	1,966	1,326	415	504	262	1,217	752	465	.....
May	47,412	9,786	8,556	6,499	2,218	6,905	2,207	.....	769	214	322	940	147	1,767	.....
June	46,785	13,273	.....	.....	2,208	.....	.....	.....	1,512	.....	331	.....	.....	.....	.....

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1] United States imports of guayule are included in this compilation. * Figure is provisional; final figure will be shown immediately it becomes available.

A Section Devoted to Listings of Leading Producers and Distributors of Raw Materials, Machinery and Equipment, and Supplies for the Rubber Industry.

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